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Nonspastic Muscle Disorders of Infancy and Childhood

Herman Chor, M.D.

The development of motor activities in the child is watched with keen interest by most parents. The newborn infant exhibits many reactions which imply a normal development and consequently are looked for from the time of the initial inspection in the delivery room. Crying, yawning, sneezing, sucking and sleeping are present at birth. Although the spontaneous activity and general motility of the newborn appears wild and highly uncoordinated there are definite movements which the infant should be able to perform. He should be able to turn his head from side to side when lying on his back and when prone turn the head to free the nose for breathing. He should be able to lift his head momentarily. If an object is placed in his palm the grasp reflex is elicited.

Specific abilities should appear within a few weeks. The young infant constantly makes waving motions with one or both hands. He may follow the light with the eyes but does not fix accurately and the ocular movements are usually noncommitant. Efficient sucking movements and swallowing indicate normal tongue, facial and pharyngeal activity. A loud cry usually is welcomed as a sign of vigor. By the second month crying is accompanied by tears and expressions of distress. The child may smile when pleased. The head and eyes may turn toward sound. By the third month this usually will be done.

At four months the infant should be able to lift his head when prone and he makes an effort to sit up when on his back; this, of course, involves lifting the head and shoulders. Some authors claim that at this time many infants can sit with support and hold the head erect. At five months the infant begins to reach out and grasp with one hand. At six months the child can lift the head and chest. At this age practically all infants can roll onto their backs when placed on their sides and from back to side. The six months infant begins to reach toward objects which are out of reach and to grasp all objects which he sees. He should begin to distinguish people.

By nine months sitting alone should be established by practically all normal children. At this time about 75 per cent of infants can crawl and creep and at thirteen months all infants can. Some infants begin to walk without going through a creeping stage. The child begins to pull himself up to a stand when he feels sufficient strength in his lower extremities. At first he maintains his balance by holding to the walls or furniture. This reaction usually occurs in the ninth or tenth month.

At ten months stepping movements are attempted and many children can walk with assistance. Standing alone appears in the eleventh month and is fully developed at eighteen months.

At one year rising to a standing position without help is present in about 60 per cent. At this age most children walk with assistance and less than 50 per cent can walk alone. At eighteen months practically all children can stand alone and walk alone.

By the second year the child should run about actively, be talking freely, have acquired a small vocabulary, understand short sentences and should arise from the floor in almost adult

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fashion. If no attempt to walk is made at this age, the child may be defective.

The child should develop a reasonable use and control of his muscular functions, including speech, by the time he is three years old.

EXAMINATION OF THE MOTOR SYSTEM OF THE CHILD

In examining the newborn one should note first its size and general development. Any gross abnormality in posture, as for example, the position of the arm in brachial plexus palsies, congenital contractures (clubfoot) or the retraction of the head in meningitis, should be recognized. Likewise the large head of hydrocephalus or the presence of a protruding mass along the spine, a meningomyelocele with spina bifida, should not escape notice. The spontaneous movements of the infant, whether active and vigorous or placcid and docile, are then observed. If all extremities are moved freely we may assume that there are no lesions of the motor tracts in the spinal cord, brain stem and peripheral nerves. Ford states that movements of infancy are not mediated by the cerebral cortex and a child who has suffered injury to the motor cortex and pyramidal tract sufficient to cause hemiplegia may seem to use the extremities equally well for some months after birth. Muscle tone should be tested by passive movements of the extremities. Unusual flaccidity or rigidity should be noted. It should be kept in mind that the legs of the normal infant often seem rigid especially when the baby is crying. Difficulty in nursing should be investigated. Weakness of the tongue, facial and pharyngeal musculature may be responsible.

Examination of the reflexes of the infant are most important. The tendon jerks are present from birth in normal children. Stimulation of the plantar surface of the foot usually results in an extension of the great toe with fanning of the others, similar to the Babinski sign. This usually persists until the end of the first year. The persistence of this response after two years of age denotes involvement of the upper motor neuron. The abdominal reflexes are not fully established until some time between the second and sixth months. There are several reflexes which are peculiar to infancy. (1) The sucking reflex, opening of the lips and movements such as are employed in sucking, should be elicited by stimulation of the lips or indeed almost any part of the face. The response should disappear by the end of the first year. Its presence later in life suggests disease of the nervous system. (2) The grasping reflex is obtained during the first few weeks by stroking the infant's palm. The test object will be grasped immediately. Frequently a similar grasp reflex is obtained by stroking the foot. The grasp reflex disappears between the second and fourth months. A grasping response similar to this observed in normal infants may occur in the adult with a lesion of the frontal lobe. (3) The Moro reflex is provoked by almost any sudden stimulus such as a loud noise, quick passive movement or a sudden tap upon the abdomen. The reaction consists of abduction and extension of all four extremities which often is followed by adduction and flexion especially of the arms. This reflex is present under normal conditions during the first three months of life and usually disappears before the fifth month, although defective children may exhibit it in fully developed form for years. (4) Tonic neck reflexes or righting reflexes may be examined as follows: If the child is placed upon its back and the head rotated to one side the thorax is swung over to produce a symmetrical alignment of the head and body. Also, if the child is held face downward by the examiner's hand under its trunk the child will lift its head and legs upward and its spine is curved up concavely. This is a labyrinthine righting reflex. If the head is passively flexed forward, the effect of this neck reflex will be to produce a flexion of the body.

In older children examination of motor cranial nerves and other functions may be carried out. Any ptosis of the lid or inequality of palpebral fissures should be noted. If the child is old enough to understand he should be asked about diplopia. Ocular movements should be tested and nystagmus looked for. Any asymmetry of the face, difficulty in wrinkling forehead or closing the eyes or disturbance in facial expression should be noted. Examination of the pharynx as to position of the uvula, movements of the soft palate, difficulty in swallowing or regurgitation of fluids gives information regarding the ninth and tenth cranial nerves. Likewise a hoarse or nasal voice may be significant. Drooping of the shoulder or abnormal position of the scapula bears witness to involvement of spinal accessory nerve, and protruding the tongue will reveal any weakness, atrophy or abnormal tremors.

The presence of weakness, atrophy or abnormal movements in any muscle group of the extremities or trunk may be elicited by systematic examination. Tests for coordination such as the finger-to-nose and the heel-knee-toe tests may reveal signs of weakness or dyssynergia. The gross posture or the gait of the child may be significant. In addition, there are special tests which may be utilized when certain specific diseases are suspected. The characteristic manner in which a child with pseudohypertrophic muscular dystrophy rises from a recumbent position by "climbing up his legs" may be mentioned as one such special test.

MUSCLE DISORDERS RECOGNIZABLE AT BIRTH

From the outset there may be certain signs and symptoms which should arouse some anxiety on the part of physician and parent. Lack of spontaneous activity, a feeble cry, difficulty in nursing, apathetic responses to holding or other stimulation are among the earliest signs of some morbid condition. If the infant feels limp "like a rag-doll" or if his extremities are held very rigid or assume abnormal or fixed postures, further examination is indicated. Although many children who are slow in developing during infancy eventually "catch up" and show normal behavior, nevertheless the physician should be cautious in saying "the child will grow out of it."

There are many disorders of the skeletal musculature or of the neuromuscular system which may be recognized at birth. These are considered prenatal diseases and among them may be mentioned (1) congenital defects of muscle, congenital muscular hypertrophy, (2) congenital defects of the central or peripheral nervous system, (3) Mongolian idiocy, (4) amyotonia congenita, and (5) acute birth injuries resulting in peripheral nerve tears, brachial plexus injuries, or cord and brain lacerations. Such conditions are relatively obvious immediately after birth. Frequently, however, less gross injuries escape notice until their sequellae come to light some time afterwards.

Congenital Defects of Muscle. Congenital absence of certain muscles are rare. As a rule, obvious incapacitation calls attention to this possibility. The most commonly involved muscles are the pectoral and sternomastoid. Such defects usually are unilateral.

Congenital contractures produce deformities associated with shortening and fibrosis of muscles; clubfoot, torticollis, congenital elevation of the scapula and multiple contractures of the extremities (amyoplasia congenita) occur frequently enough. They may be accompanied by harelip, congenital dislocation of the hips or other defects.

Congenital hypertrophy of the muscles has been reported by several authors. Such infants present an amazing athlete or wrestler habitus with symmetrical muscular hypertrophy of the skeletal musculature. Associated with this muscle feature is extrapyramidal motor disturbance and mental deficiency. De Lange in 1934 called attention to such a syndrome, describing three cases observed personally.

Congenital Defects of the Nervous System may show local gross features, such as a large head (hydrocephalus), a protruding mass along the spine (meningocele or meningomyelocele with spina bifida), and so forth. In addition, spastic diplegia or paraplegia may be demonstrated with brain lesions, whereas weak, flaccid extremities suggest some spinal cord defect (myelodysplasia).

Birth Injuries to the peripheral nervous system may result in a brachial plexus palsy. The most common is Erb's paralysis which is produced as a result of damage to the upper portion of the plexus by undue separation of the head and shoulder, resulting from traction on the head when there is difficulty in delivering one shoulder. The position of the limb is characteristic. It hangs at the side internally rotated at the shoulder, with the elbow extended and the forearm pronated. Movements of the wrist and fingers are unaffected. Occasionally a small area of anesthesia and analgesia may be found overlying the deltoid although sensory loss may be absent. Sometimes the lower plexus may be damaged at delivery. In such cases the resulting paralysis involves all the small muscles of the hand, giving rise to a claw hand. This is the Klumpke type of palsy.

In difficult breech delivery the spinal cord or its roots may be injured resulting in a flaccid paralysis of both legs, complete loss of sensation and sphincter paralysis.

Mongolian Idiocy may be recognized at birth. In addition to the classic features of small brachycephalic head, narrow, slanting palpebral fissures, epicanthus and thick protruding tongue, a very constant and characteristic feature is muscular hypotonia and relaxation of the ligaments. The infant is abnormally inert and placid, lying still for hours without crying or complaining. Sometimes a

correct diagnosis is missed at birth but within a few months it becomes evident that the infant is not making proper progress. There always is delay in holding up the head, sitting up, standing and walking.

Amyotonia Congenita (Oppenheim's) is a muscle disease which may be present at birth. There is a generalized weakness and flaccidity of the skeletal muscles which feel soft and doughy. The tendon reflexes are absent. The lower extremities are always involved; then in frequency of occurrence, the upper extremities, trunk and face. The involvement usually is symmetrical. Associated with this marked hypotonia of the muscles is flaccidity and lengthening of the ligaments of the joints so that the extremities may be placed in bizarre positions. Although the extremities involved appear paralyzed, the condition is one of weakness, so that many movements are possible in any given extremity. The infant will lie in any position in which it is placed, completely helpless and motionless.

There are no atrophies, no fibrillary twitchings. The electrical reaction of muscles shows a weakness in contraction rather than a reaction of degeneration. Sensibility seems to be normal. It seems that those muscles more closely concerned in vital processes—muscles that are employed in sucking, swallowing and respiration—tend to escape in amyotonia. The general health and vitality of the infant seems good so that not infrequently the condition is not appreciated until many months after birth. It may be made evident by the occurrence of an acute illness—that is, bronchitis, bronchopneumonia or severe diarrhea. The course of amyotonia is of particular significance inasmuch as there is a slow, gradual spontaneous improvement, although the musculature never reaches the healthy adult musculature. Most cases do not survive intercurrent infections very well, and death from bronchopneumonia at an early age is the usual story. This emphasizes the need for early recognition of the disease so that the child may be protected, as much as possible, from exposure to infections.

MUSCLE DISORDERS USUALLY RECOGNIZED DURING FIRST YEAR OF LIFE

There are several disorders which may be recognized during the first year of life. At birth and for several months therafter the child seems to be quite healthy. Then it becomes sluggish, apathetic, fails to fix objects with the eyes, shows lack of interest in the surroundings and above all, loses those motor reactions which it had already acquired.

Amaurotic Family Idiocy is such a disease. It should be thought of particularly if the child is of Jewish extraction. The condition may be recognized as a rule between the second and twelfth months. At birth and for several months thereafter the child seems to be quite healthy. As a rule a change in behavior is noted between the fourth and eighth months. There is evidence of regression. The child may cease to sit up and later becomes unable to hold up its head. The muscles become very soft and velvety. The child no longer fixes objects with the eyes and it becomes apparent that there is a disturbance in vision. Ophthalmoscopic examination will reveal the diagnosis at once. The pathognomonic appearance of a cherry red spot in the macular region is easily recognized. The symptoms progress slowly. Within a few months the child becomes entirely blind, demented and more or less completely helpless. The musculature, although flabby in the early stage, usually becomes spastic, and hyperactive deep reflexes, the Bakinski sign and other pathologic reflexes indicative of pyramidal tract involvement make their appearance. Convulsive seizures may occur. Pseudobulbar palsy eventually appears and death usually sets in within two to four years.

Werdnig-Hoffman Progressive Muscular Atrophy is an infantile affliction which is familial and may be hereditary. The child appears quite normal at birth and develops normally for several months or occasionally for the first year or two. Weakness usually begins in the pelvic girdle and lower extremities where muscle atrophy becomes evident. The shoulder girdle becomes involved and atrophy extends into the arms. The deep reflexes are diminished or absent in accordance with the degree of muscle disease. There is a complete reaction of degeneration. The disease runs a fairly rapid course leading to a fatal outcome in a relatively few years. Some think that this disorder is identical with Oppenheim's disease. Further study is needed, however, to prove or disprove this contention. There are obvious differences both in the clinical course and in the histopathologic findings in the two diseases.

MUSCLE DISORDERS NOT USUALLY SUSPECTED UNTIL CHILD BEGINS TO WALK

At eighteen months practically all children should be able to stand alone and walk alone

and by two years they should run around actively. Frequently it is not until about this time that a motor defect may be suspected. Clumsiness and repeated falling may usher in the so-called *muscular dystrophies* which may not have been suspected in the earlier stages of the child's behavior. In this type of muscular trouble careful questioning usually will uncover a hereditary or familial incidence. Such a history readily establishes the diagnosis. As a rule the trunk, pelvic or shoulder girdle muscles are first involved, followed later by extension into the distal portions of the extremities. The child begins to waddle instead of walk. In rising from a recumbent position the child goes through a characteristic procedure of "climbing up his legs." He usually "turns over on his abdomen and pushes his trunk off the ground so that he is in the kneeling position. He then lifts his body up so that his legs can be extended to place himself on his feet. He then extends his trunk to the upright by climbing up his body with his hands" (Grinker). In some cases the general appearance of the child belies the actual state of his musculature. He may look like a fine muscular specimen, indeed, with bulging calfs and biceps. This is the pseudohypertrophic type in which the muscles grossly look large and strong but are composed largely of fibrous tissue and fat instead of healthy muscle fibers. The abdominal musculature usually is weak giving rise to the "pot belly" and to compensate for the weakness of the thigh muscles and the extensors of the trunk the child adopts a lordotic position. When the muscles of the shoulder girdle are involved there may be winging of the scapula. The upper extremities are very weak and loosely attached to the trunk. When an attempt is made to raise the child, holding him under the arm pits, the shoulders are pulled up but the head and neck sinks down into the chest. In many instances the weakness is associated with considerable atrophy and wasting of the muscle substance instead of the pseudohypertrophy. The facial muscles are sometimes dystrophic and give rise to the so-called myopathic facies with an overhanging upper lip for which the name "tapir" facies has been applied. There are several clinical varieties of the dystrophies depending upon the combination of muscle groups involved.

Although occasional reports in the literature describe changes in the anterior horn cells and alteration in the fiber tracts, it is commonly accepted that the essential pathology is in the muscle. That status of the intramuscular nerve endings, which has been studied but little, deserves further scrutiny especially in view of the more recent emphasis on the importance of the myoneural-junction in various motor disorders.

Cerebromacular Degeneration. Occasionally retardation in walking and clumsiness in the use of the child's muscles may be associated with impairment of vision. The child will not follow the light nor will he appear interested in his surroundings. These syndromes are very similar to amaurotic family idiocy with the exceptional feature of the absence of the "cherry red spot" in the macula.

MUSCLE DISORDERS WHICH OCCUR IN LATER YEARS OF CHILDHOOD

In the later years of childhood there are many diseases which manifest themselves by motor symptoms. *Anterior poliomyelitis* or *infantile paralysis* occurs most frequently between the second and fifth years of life. The clinical picture is well known and needs but little comment here. The acute onset with or without prodromal symptoms suggestive of an infectious illness, especially when observed in the summer months and when the presence of this epidemic in the vicinity is known, naturally suggests this diagnosis. The distribution of the acute paralysis, involvement of small groups or parts of a group of muscles, usually points to a disease of the motor neurons in the spinal cord. The spinal fluid findings of a moderate pleocytosis supports a diagnosis of "infantile paralysis." The course of the disease likewise helps to differentiate it from other muscle disorders. In acute poliomyelitis the maximum of muscle involvement usually is reached very quickly with improvement or with cessation of the process made obvious within a few months. This is in contrast to many other muscle disorders which are characterized by slow progression over many months or years.

Family Periodic Paralysis is a rare muscle disorder which, however, occurs frequently enough in childhood. It is characterized by recurrent sudden attacks of flaccid paralysis of the skeletal musculature. Such attacks may last from several hours to as long as several days. Pathognomonic of the disease is the loss of mechanical and electrical irritability so that the deep reflexes are absent and the muscles fail to respond either to faradic or

galvanic stimulation (Cadaver reaction). The attacks usually occur in the early morning hours. The patient may be perfectly well when he goes to bed but wakes up in the night or next morning completely paralyzed in the extremities and neck muscles. Usually the voice and psyche are normal and the dramatic spectacle frequently is misdiagnosed hysteria or malingering.

Although in a majority of the cases reported in the literature the onset was observed during the second decade of life especially around puberty, in many the attacks began between the ages of four and ten years. In a few cases the attacks were first noticed shortly after the child learned to walk. A familial incidence usually is present, 80 per cent of cases reported—although sporadic, "isolated" cases have been diagnosed. The paralysis usually begins in the muscles of the hips and shoulders and spreads peripherally. Most frequently the lower extremities are chiefly involved, although all four show total or partial paralysis. The muscles innervated by the cranial nerves are practically never involved. The paralysis usually disappears in reverse order to that in which it came.

Disease of the thyroid has been found associated with periodic paralysis. There have been several cases where following a thyroidectomy for hyperthyroidism the recurring periodic paralysis cleared up entirely. The frequent occurrence of weakness of the quadriceps femoris muscles in hyperthyroidism is well known. Although muscle wasting is not a feature of this syndrome it has been reported that some subjects of periodic paralysis developed in later life an atrophy of these muscles that had been most affected by paralysis. Spontaneous remissions occur and evaluation of therapy therefore is difficult. The finding of a low blood potassium during the attacks suggested the use of potassium as a therapeutic drug and there are many cases which claim excellent results from such treatment.

Myasthenia Gravis rarely is observed in patients under ten years of age, although the literature reveals several cases with an onset in early infancy. This disease is characterized by abnormal fatiguability of the skeletal musculature. The muscles most frequently involved are those supplied by the cranial nerves hence giving rise to weakness of the eye muscles with diplopia, ptosis of lids, difficulty in chewing and swallowing. In addition, the muscles of the extremities may show a similar disturbance as revealed by weakness and clumsiness in performing various movements or tasks. With rest there is an amelioration of the difficulty and as a rule the muscles perform much better in the morning hours after a night's sleep only to "peter out" later in the day after the child has been using them.

On examining the patient the myasthenic response may be elicited by having him perform movements repeatedly and noting the early appearance of fatigue and pseudoparalysis. Repeated stimulation with electric current also will demonstrate this fatiguability, a test known as the Jolly Myasthenic Reaction. There is no reaction of degeneration. As a rule there is no muscle atrophy in myasthenia gravis. In some cases of long duration, however, wasting of the involved muscles has been reported. Spontaneous remissions have been cited but prior to the use of prostigmin the prognosis was extremely grave. The patients usually experienced difficulties in deglutition and eventually died from intercurrent infection, especially pneumonia.

There has been some comment on a possible relationship between myasthenia gravis and disease of the thymus gland or disturbance of the lymphatics. The occurrence of collections of lymphoid cells in the myasthenic muscles is the one consistent pathologic finding. More recently, however, attention has been focused upon the myoneural junction as the possible seat of this disorder. A disturbance in the acetylcholine-esterase balance has been suggested. Either the esterase concentration at the myoneural junction is excessive or there is a periodic exhaustion of acetylcholine at the end-plate. Prostigmin presumably has a protective action on acetylcholine. It facilitates the action of acetylcholine and so stimulates the voluntary muscles via the myoneural junction.

Myotonia Congenita or Thomsen's Disease. Occasionally one encounters a child who presents the complaint of difficulty in walking or initiating movements which disappear on exercise. Usually such individuals show excellent muscular development and give the impression of being unusually strong. This syndrome described by Thomsen is known as *myotonia congenita.* It is thought to be due to some metabolic disturbance at the myoneural junction of a nature just opposite to that found in myasthenia gravis. In myotonia, the

patient has marked difficulty in starting to walk or climb or grasp an object, but with repetition, these movements become easier. Having the patient shake hands frequently will show this disability in that the patient is unable to release the grasp until he forcefully and repeatedly attempts to contract and relax the hand muscles. The muscles of a myotonia patient show localized myotatic reaction to percussion and the reflexes are markedly reduced. Quinine has been found to relieve this condition in a spectacular manner and more and more cases are appearing in the literature bearing witness to the specificity of this form of therapy.

In contrast to Thomsen's Disease in which myotonia is associated with muscle hypertrophy, there are cases in which atrophy occurs instead of hypertrophy. This syndrome has been designated *myotonic dystrophy*. It is extremely rare in childhood.

CONCLUSION

Thus it may be seen that there are numerous specific syndromes characterized by alterations in the skeletal musculature which occur early in life. In contrast to that group familiarly referred to as "spastic," in which the muscle pathology and the plan of therapy are more generally known, these muscle disorders vary considerably, and hence require careful consideration as to correct diagnosis, prognosis and treatment.

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Anatomical and Mechanical Considerations of the Knee Joint

George T. Aitken, M. D.

Years ago affections of the knee joint were treated by the bone setters. By considerable clinical initiative and empirical manipulations, this group did much to relieve their patients. So much, in fact, that they usurped the position of the physician. As advances were made in physiology and anatomy, regular practitioners became better equipped to cope with these affections; and, finally, after Annandale had operated upon the knee for a torn semilunar cartilage, the treatment of disabled knee joints came to be directed largely by physicians. Such names as Hunter, Goodsir, Annandale, and Scott Long are intimately associated with this transitional period. Their investigations and tabulation of details gave the clinicians a clearer understanding of the problems of the knee joint together with a much clearer idea of those therapeutic measures which could be considered useful.

We have progressed very little since that time. We have improved the mechanical features of surgical technique but our knowledge of "the why" of knee joint injuries has not developed materially.

It is the aim of this paper to present the salient anatomical and mechanical features of the knee joint together with some deductions as to their relation to injuries to the menisci.

The knee joint is a true joint. It is made up of the articulation between the condyles of the femur and patella, and the articulation between the condyles of the femur and the condyles of the tibia. The tibio-femoral articulation was apparently at one time in phylogeny a double joint because embryologically man passes through this stage. Keibell and Moll[1] say, "A knee joint cavity first appears in embryos about 30 mm. long between the patella and the femur. According to Lucian, two other cavities somewhat later appear between the condyles of the femur and menisci. These cavities secondarily communicate with the retropatellar cavity and with cavities formed between the menisci and the tibia. The cavity of the knee joint primitively is partly

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divided into two parts by a median septum (lig. mucosum), which becomes greately reduced in fetuses 10-12 cm. long and in the adult is replaced by a fat pad." The adult human knee joint is separated into two parts by the cruciate ligaments and their covering of synovial membrane posteriorly and the alar ligaments and the patellar synovial fold anteriorly. The synovial membrane is continuous, however, one side with the other. The term "knee-joint" in this paper will refer to the tibio-femoral articulation, because the patella is a sesamoid bone developed in the tendon of the quadriceps muscle and is held in constant relation to the tibia by the patellar ligament.

The joint capsule is composed of heavy, white fibrous tissue. It is attached to the femur about 3-5 cm. above the intercondyloid notch anteriorly. It extends from here to a position just above the articular surfaces of the condyles. It is attached inferiorly to the tubercles of the tibia just beyond the articular surfaces. It may be continuous with the capsule of the proximal tibio-fibular articulation. The capsule posteriorly is thin and much less extensive. It extends from the intercondyloid notch to a point just below the edge of the articular surfaces of the tibia. The capsule anteriorly is reinforced by fibrous extensions from the vasti which are attached to the periphery of the patella. The fascia lata which is superficial is also attached to the anterior surface of the patella. The distinctness of these layers varies considerably in different specimens.

The knee joint is further reinforced by several heavy accessory ligaments. Those which reinforce it external to the capsule are (1) tibial-collateral ligament, (2) fibular-collateral ligament, (3) oblique popliteal ligament, (4) coronary ligament, and (5) patellar ligament. Some of these are fused with the capsule and others are definite, separate ligaments.

The tibial-collateral ligament, which is an extension downward of the tendon of the adductor magnus, passes down as a broad band attached to the capsule along the medial side of the joint and extends along the medial side of the shaft of the tibia to be inserted into the periosteum 5-7 cm. below the superior tibial articular surface. The oblique popliteal ligament is a broad band variable in size and strength which runs from the medial side of the lateral condyle posteriorly and inferiorly to become reflected fibers of the tendon of the semimembranosus. This ligament is fused with the capsule as it passes across its posterior aspect and cannot be separated from it except by artificial dissection. The fibular-collateral ligament is a true accessory type. It runs from the head of the fibula to the tubercle on the lateral aspect of the lateral condyle. It is a strong fibrous band of inelastic tissue which is not fused with the capsule. The tendon of the biceps femoris splits inferiorly to enclose it, and deep to it pass the tendon of the popliteus muscle and the inferior, lateral genicular artery and nerve. The coronary ligaments are those portions of the capsule which extend from the periphery of the menisci to a point below the articular surfaces of the tibia. Since they definitely are capsule and not a fused ligament, they are entitled only by definition to the name "ligaments." The patellar ligament is really the tendon of insertion of the quadriceps femoris muscle which is fused with the capsule anteriorly.

The knee joint is reinforced within the capsule by the anterior and posterior cruciate ligaments. The cruciates arise on the non-articular surfaces anterior and posterior to the intercondyloid tubercle of the tibia respectively. The anterior one passes backward, upward and lateralward to be inserted on the medial aspect of the lateral condyle. The posterior one passes anteriorly, upward and medially to be inserted on the lateral aspect of the medial condyle. It is well to note that this type of origin and insertion produces an X-like

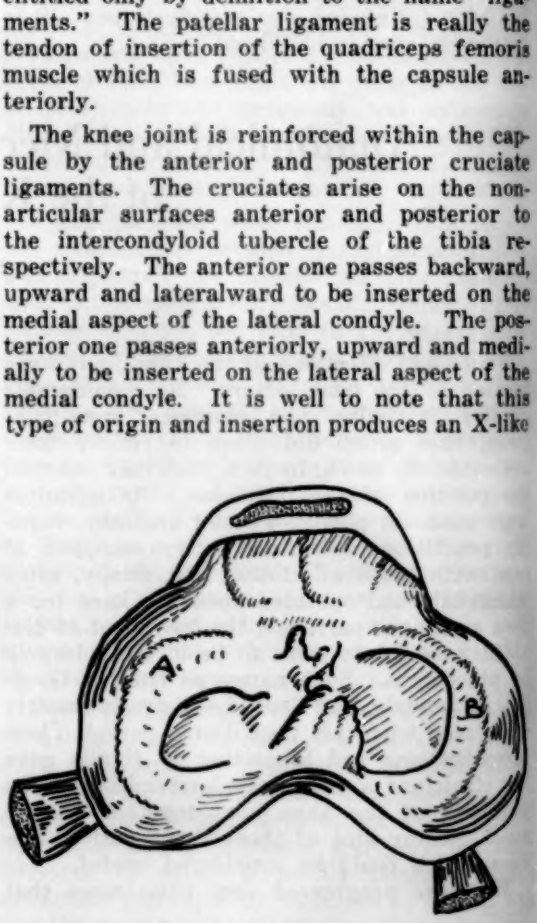

Fig. 1. Posterior view of the knee joint and capsule. A. Medial meniscus. B. Lateral meniscus. C. Attachment for cruciate ligaments.

crossing such that the limbs of the X are not wholly in either the anteroposterior or transverse planes. Complete extension tends to unwind these ligaments with resultant rotation of either the tibia or femur or of both.

The menisci or semilunar cartilages are two roughly crescentic incomplete cartilaginous discs, thickened at their periphery and tapering to paper thickness toward a dehiscent center. They are interposed between the medial and lateral condyles of the femur and the respective articular surfaces of the tibia. The medial one definitely is crescentic while the lateral one is more nearly circular (Fig. 1). The anterior horn of the medial meniscus is attached on the nonarticular surface of the tibia anterior to the intercondyloid tubercle and the anterior cruciate ligament while the posterior horn is attached to the posterior nonarticular surface between the attachments of the posterior cruciate ligament and the posterior horn of the lateral meniscus. The anterior horn of the lateral meniscus is attached on the anterior nonarticular surface of the tibia between the anterior cruciate ligament and the intercondyloid tubercle while the posterior horn is attached to the posterior nonarticular surface between the posterior horn of the medial meniscus and the intercondyloid tubercle. The menisci are further held in place by the previously mentioned coronary ligaments together with the transverse ligament and the Ligament of Wrisberg. The transverse ligament is a small fibrous band connecting the anterior portions of the menisci. It is an inconstant structure. The Ligament of Wrisberg is a true extension upward, anteriorly and medially of the posterior part of the lateral meniscus. It attaches to the lateral aspect of the medial condyle and reinforces the posterior cruciate ligament. The medial meniscus is firmly attached to the capsule at the point where the tibial-collateral ligament fuses with the capsule. The lateral meniscus does not have a similar attachment in the region of the fibular-collateral ligament.

The knee joint is further reinforced by the tendons which surround it. The heavy patellar or quadriceps tendon anteriorly needs no description. There is the tendon of the biceps femoris and the lateral head of the gastrocnemius posterolaterally, and posteromedially there are the tendons of the semitendinosus, semimembranosus, gracilis, and sartorius together with the medial head of the gastrocnemius. The origin and insertion of all of these are quite familiar and need no repetition. I would like to stress again that the oblique popliteal ligament is the reflected fibers of the semimembranosus muscle. The tendon of the popliteus muscle is interesting. It penetrates the posterior part of the capsule to pass anteriorly and upwards in a groove in the periphery of the lateral meniscus and is inserted, deep to the upper termination of the fibular-collateral ligaments, on the tubercle of the lateral aspect of the lateral condyle. The intracapsular portion of this tendon is connected by a band of fibrous tissue, which varies in size and strength, to the capsule at the level of the meniscus but not to the meniscus directly. Since this tendon passes through the capsule it must be considered as a weakness and not a reinforcement.

The knee joint is not only a very satisfactory but a remarkable creation mechanically. It allows for great range of motion in all necessary directions while still retaining great strength and the ability to bear weight satisfactorily. In short, it combines mobility and stability—two attributes seldom seen so well and intimately combined.

Consideration of its types of motion is essential to a proper classification of this joint. Flexion and extension are the most important ones and are considered first. These motions take place on an imaginary transverse axis passing through the condyles of the femur in the frontal plane and parallel to the tibial plateau. Inspection of the condyles of the femur reveals that a true ginglymus motion would roll the femur off the tibia since the condyles are not the arcs of a single circle. In order to compensate for this there has to be a sliding or arthrodial type of motion intimately combined with the ginglymus motion. Actually this is true. Steindler[2] states that "At the beginning of the flexion movement there is a pure rocking motion; equi-distant points of the femur touch in sequence equidistant points of the surface of the tibia. After a flexion of twenty degrees has been obtained, however, the type of motion changes. It becomes a gliding motion. . . . The motion starts with true rocking but very soon takes on a gliding element which, gradually increasing, finally completely substitutes the former type." This causes a mechanical shift from anterior to posterior of the imaginary transverse axis as flexion is accomplished, the reverse being true as the joint is extended.

Secondarily, but as important, there is a rotary motion in this joint. John Goodsir[3] described this rotary motion as follows in

1860: "These remarkable movements of rotation inwards and outwards, inseparable from the commencement of flexion and the completion of extension, take place around the axis of an ideal cone, which axis is directed at an angle of 45 degrees downwards, outwards, and backwards in front of the spine of the tibia, the oblique axis of the knee joint."

This statement was verified on dissection material in the following manner: A knee joint was completely stripped except for the two collateral ligaments, the cruciate ligaments, the Ligament of Wrisberg, and the popliteus muscle and tendon. The menisci were left in place. Holes were drilled through the tibia and femur with the joint in complete extension so that they were parallel and in the frontal plane. Eighteen-inch brass rods were then inserted and the joint was passively flexed and extended, the tibia being fixed. It was found by protractor measurements that there was 18-20 degrees of rotation from the position of complete extension to complete flexion. The lateral rotation was complete at about 25 degrees of flexion, and the medial rotation did not start until about 155 degrees. These readings do not express the degree of medial or lateral rotation but rather they express the sum of the two. These findings were constant in all specimens examined.

Fig. 2. Anteroposterior view of the lower end of the femur showing the relationship of the planes of the medial and lateral articular surfaces.

A close inspection of the condyles of the femur will reveal the reason for this. The contours of the condyles are asymmetrical and neither of them is the arc of a single circle (Fig. 2). The radii of the circles, arcs of which make up the condyles, vary from anterior to posterior to the ratio of 9:5. Further, the anterior one-third of the medial condyle is set at an angle of 15-20 degrees from the anteroposterior plane and is not, as are the posterior two-thirds, parallel with the lateral condyle. This deviation of the anterior one-third of the medial condyle acts as the male part of a screw and explains why we have medial and lateral rotation of the femur on the fixed tibia in extension and flexion.

Walmsley[4] in his discussion of the articular mechanism of the diarthroses says that the stability of a joint depends upon complete congruity of the joint surfaces in a screwed home or locked position. He further states that there are two types of mechanisms associated with joints: (1) the movement mechanism or muscles, and (2) the articular mechanism or "that which brings the joint surfaces into that one relationship with each other in which they can transmit weight and which retains them in that relationship without the active contraction of muscles; which transforms them in the functional sense, from diarthroses to synarthroses."

These postulates are adequately fulfilled in the knee joint. Let us analyze extension since that is the position of weight bearing and, therefore, the position in which the knee joint, a diarthrosis, should be converted into a synarthrosis. On the basis of previously stated anatomical and mechanical deductions, it is possible to reconstruct the manner in which the "articular mechanism" functions.

There is a tightening of all the ligaments around the knee joint due to an increased ratio of the radii of the arcs of the condyles from behind forward as extension is approached. Both collateral ligaments become stretched to their fullest physiological length in complete extension. The cruciate ligaments are also stretched tight, thus helping to bring the articular surfaces into full congruity. The unwinding of the X-like twist of these ligaments assists in medial rotation of the femur on the fixed tibia. This aid in medial rotation is possible since the cruciates are neither truly in the anteroposterior or transverse plane but rather partly in both. The stretching of the Ligament of Wrisberg also aids in medial rotation of the femur since it is attached from lateral to medial. Finally, the medial rotation of the femur on the fixed tibia, due to the obliquity of the anterior one-third of the medial condyle, completes the "screwing home" in full extension. The sum of these processes is complete congruity of the femoral condyles and the menisci in a locked position as demonstrated in dissected specimens.

Here, then, is a diarthrosis converted functionally into a synarthrosis. The ligaments hold this joint in a position for satisfactory weight bearing with the maximum economy of muscle action so long as the locked position is maintained.

There is also an adequate distribution of

the "movement mechanism" or muscles. The quadriceps extensor, the muscle doing the most work, is not only the largest but it has the sesamoid patella enclosed in its tendon to supplement its mechanical advantage by the increased leverage. The hamstring group, reinforced by the gracilis, sartorius and gastrocnemius, is located posteriorly. These are all placed not only posterior to the transverse axis of the joint but also posterior to the condyles to preclude, even in full extension, a "dead center." The distribution medially and laterally allows for medial and lateral rotation after flexion has been initiated.

Fig. 3. Diagrammatic representation of the popliteus muscle showing its action upon the tibia and femur.

The discussion of the popliteus muscle has been withheld until now since its function appears to be that of a rotator. It is a weak flexor of the knee joint since it passes across the joint posterior to the transverse axis. Its mechanical advantage as a flexor is very small because of its oblique position. This position does, however, give it considerable mechanical advantage as a lateral rotator of the femur on the fixed tibia (Fig. 3). It has been shown that medial rotation of the femur on the fixed tibia is synchronous with the completion of extension and that lateral rotation of the femur on the fixed tibia is synchronous with the commencement of flexion. Keeping in mind the manner in which medial rotation of the femur on the fixed tibia locks the knee joint in full extension, may it not be said that lateral rotation of the femur on the fixed tibia initiates flexion by unlocking the "articular mechanism"? Acceptance of this hypothesis makes the popliteus muscle the initiator of flexion of the knee joint by virtue of its great mechanical advantage as a lateral rotator of the femur on the fixed tibia. It is easy to understand that the action of the semimembranosus transmitted through the oblique popliteal ligament would reinforce the lateral rotary action of the popliteus muscle, once flexion has been started (Fig. 4).

The etiology of injured menisci has always been a puzzle. Many things have been written about "internal derangements of the knee joint," but in general our knowledge is still fundamental.

The menisci are described as traveling backwards in flexion and forward in extension. During axial rotation of the femur each meniscus follows its respective femoral condyle. Dissected knee joints, from which all of the muscles have been removed, demonstrate, in passive flexion and extension, that this description of the movements of the menisci is accurate. Some of the muscles acting on the knee joint are attached to the menisci. Some are attached to the capsule to act indirectly through the coronary ligaments on the menisci. It must be concluded, then, that the menisci are capable of physiological movements without the aid of muscle pull. Is it not reasonable to consider the indirect action of the muscles on the menisci as a means of insuring synchronization of the movements of the menisci and femoral condyles since the muscles control not only the action of the joint but the rate of change in position of it?

Authorities describe the etiology of injured menisci as sudden extension from a flexed position with forcible rotation of either the leg or thigh, the meniscus injured depending on the type of rotation. In view of the anatomical and mechanical knowledge, would it not be better to consider this injury as due to a desynchronization of the movements of the femoral condyles and menisci secondary to a forcible extension rather than to extension and rotation? Would not a sudden disturbance in body equilibrium call forth a violent muscular reaction which could, by its indirect action on the menisci, destroy the timing of the movements of the condyles and menisci? Extension would be necessary to produce the injury. If the joint were fully extended, the articular surface would be fully congruous,

Fig. 4. Diagrammatic representation of the semimembranosus muscle and oblique popliteal ligaments showing lines of force and rotary effect on tibia and femur.

and, secondarily, the meniscus would not be subject to movement and, therefore, not subject to injury. This concept permits explanation of a "torn or ruptured meniscus" on the basis of what took place mechanically and anatomically rather than on the basis of the position in which it occurred. The frequency of injury of the medical meniscus as compared to the lateral meniscus can be explained by the firm attachment of the former to the tibial-collateral ligament. This attachment prevents the movement of the medial meniscus "en masse." Any sudden movement of the meniscus would be hindered by this ligamentous attachment. The resulting puckering of the free border opposite the point of attachment produces an easily pinched cartilaginous fringe. A similar situation does not exist in the case of the lateral meniscus.

In short, we have an alteration in the normal physiology of the joint due primarily to the adjustment reaction of the whole organism; which reaction is due to the stress of an abnormal or pathological circumstance acting on the body whole.

The facts are sound anatomically. I believe that only a clear understanding and intelligent interpretation of the basic anatomy will permit an accurate conception of the mechanics of injury to the menisci.

CONCLUSIONS

1. Medial and lateral rotation of the femur on the fixed tibia are inseparable from the completion of extension and the beginning of flexion.

2. The medial rotation of the femur on the fixed tibia which is due to the obliquity and asymmetry of the anterior one-third of the medial femoral condyle produces in extension the "screwed home" position indispensable to stability.

3. The popliteus muscle initiates flexion by laterally rotating the femur on the fixed tibia, thus unlocking the "screwed home" position of complete extension.

4. The menisci are capable of following, under normal circumstances, the femoral condyles without the aid of muscle pull.

5. Injury to the menisci is due to a desynchronization of the movements of the menisci and femoral condyles. This break in the timing results from the violent pull exerted on the menisci through the capsule by the muscles inserted there as these muscles respond to an abnormal external stimulus exerted on the body whole.

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A Review of the Diseases of the Muscular System:

Part I: Anatomy and Physiology of the Final Common Pathway

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FOREWORD

This review of the disorders of the muscular system was presented in a series of lectures to the Ohio Chapter of the American Physiotherapy Association during February and March 1938. It is not a monograph on the subject but is intended more as a review of the fundamentals underlying the diagnosis and treatment of this particular group of diseases. Neurologists are familiar with the difficulties students encounter in getting a clear conception of such a complex subject without reading the literature in a number of widely diversified fields. Recent advances in anatomy, physiology, pathology and chemistry have given promise to a more rational approach to the study of the diseases of the muscular system. Space will not permit an exhaustive review in all of these subjects but the most essential material will be presented and correlated. The classification presented

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is simplified and practical for clinical purposes. The case reports will give the reader a better idea of the clinical types which have been described only in brief form in the text. The bibliography is not complete but contains some of the best source material for additional reading.

INTRODUCTION

Almost every disease of the central nervous system as well as many conditions belonging to other branches of medicine influence the function of the skeletal muscles. By a disease of the muscular system as presented here only those conditions will be considered which produce a direct disturbance in (1) the anterior horn cells of the spinal cord or motor constituents of the cranial nerves, (2) the peripheral nerve fibers, and their endings, and (3) the skeletal or striated muscles which are supplied by them. These three elements are physiologically inseparable and comprise the final common pathway over which any impulse regardless of its origin must pass to influence the muscle. The influence of the autonomic nervous system may be an exception to the above statement as will be shown later.

A review of this subject would be incomplete without a description of the structure and function of the final common pathway.

ANATOMY

The Anterior Horn Cell. These cells found in the anterior horn of the gray matter of the spinal cord are typical "motor" nerve cells. The cells of the motor cranial nerves (i. e., oculomotor, trochlear, facial, motor portion of the glossopharyngeal, vagus, spinal accessory and hypoglossal nerves) and the giant pyramidal cells of Betz in the anterior central gyrus of the cerebral cortex are of the same type. The motor nerve cell is large (they vary from 67-135 mu* in diameter—Stöhr) with a round or oval nucleus and a prominent nucleolus. The cell cytoplasm is triangular or multiangular shaped with prominent processes and a distinct margin. Stained with basic dyes such as thionin or methylene blue they contain prominent irregular shaped granules called tigroid or Nissl granules which vary from 1 to 4 mu in diameter and are arranged more or less evenly in rows (stichochrome cells). These granules are thought to contain nucleoproteins which contain organically combined iron. In addition to small amounts of lipochrome pigment, special stains with silver salts reveal abundant neurofibrils running through the cytoplasm of the cell body into the dendrites and axon of the cell. Such stains also make it possible to trace the extension of the dendrites, which are relatively short ramifying fibers, far into the dorsal gray matter. In suitable preparations the axon can be seen extending into the anterior motor spinal root. Nerve impulses reaching the motor nerve cells are believed to be received by the end arborizations or varicosities of the dendrites or by small varicosities which lie on the membrane of the cell (pieds terminaux).

The Peripheral Nerve Fiber. An ordinary peripheral spinal nerve, such as the radial or sciatic nerve, consists of bundles of nerve fibers surrounded by a sheath of connective tissue called the epineurium. Each individual bundle is surrounded by another similar but smaller sheath called the perineurium. The bundle of fibers is further divided into smaller groups by strands of connective tissue called the endoneurium which runs in an irregular fashion throughout the bundle. The individual nerve fiber is the conducting unit of the nerve impulse and most peripheral nerves contain both sensory and motor fibers in each bundle. The neuraxons and dendrites differ both chemically and physically but both contain delicate strands of tissue called neurofibrillae. These can be traced as a narrow bundle from the anterior horn cell down through the anterior gray and white matter into the central portion of the motor nerve fiber. They form the axis cylinder of the fiber. At the point where the axis cylinder leaves the anterior portion of the spinal cord it becomes coated with a layer of a fat-like substance called myelin. Fibers that contain myelin are called myelinated fibers. Chemically, myelin is a mixture of complex fat and lipoid substances, the greatest percentage being a compound called lecithin. The unsaturated fatty acids in this substance can reduce osmic acid to a black colored osmic oxide. If these fatty acids are oxidized by chromium salts before treatment with osmic acid, only degenerating myelin will reduce osmic acid to its black osmic oxide. Further degeneration causes the myelin sheath to break down into fatty substances which stain with dyes such as scarlet red or Sudan iii. Nerve fibers which have lost their myelin as result of further degeneration fail to stain with hemotoxylin after the fibers have been treated with iron salts. The normal myelin stains deep blue with the iron-hemotoxylin method. All of these methods depend on certain properties of myelin which

*1 mu = 1/1000 millimeter.

make it possible to study various stages of degeneration of the nerve fiber. Nerve fibers in a peripheral nerve are of varying diameters because of differences in the amount of myelin they contain, and some nerve fibers contain no myelin at all (nonmedullated). On leaving the spinal cord the nerve fiber is surrounded by a delicate membrane called the neurolemma or sheath of Schwann. Cut longitudinally along the nerve fiber it appears as a fine single strand of tissue containing an oval-shaped clear nucleus which rests upon the surface of the nerve fiber. At regular intervals along the course of the nerve fiber the myelin sheath is constricted or interrupted by a zone called nodes of Ranvier. Except for collateral branches that may branch off from the main trunk of the nerve at these nodes, its structure is little changed until it reaches the muscle fiber of the skeletal muscles. At that point it loses its myelin sheath and the fiber becomes surrounded by the neurolemma which finally ends as the nerve enters the muscle fiber leaving the naked axis cylinder to branch into terminal arborizations called the motor organ or end plate. These are attached to the striated muscle fibers.

Striated Muscle. Ordinary striated muscles are composed of a large number of muscle fibers surrounded by a connective tissue sheath called the external perimysium. An internal perimysium further divides the muscle into bundles or fasciculi. The perimysium carries the blood vessels, nerves and lymphatics to the muscle. Each muscle bundle contains a large number of muscle fibers, the essential contractile units of the muscle. These fibers vary in length from 1 to 41 mu. The muscle fiber consists of a number of longitudinal strands or myofibrils arranged in bundles frequently referred to as Cohnheim's areas. Every muscle fiber is surrounded by a sheath called the sarcolemma upon which the nucleus of the muscle fiber lies. The myofibrils seen in longitudinal sections contain alternating light and dark portions that differ in their refractivity to polarized light, the dark part being anisotrophic. This gives the muscle fibers the appearance of having cross striations or dark bands. The light bands are separated by the transverse ground membranes of Krause which unites with the sarcolemma above. These lines divide the muscle fiber into compartments or segments called sarcomeres. The dark bands in certain muscles are lighter in density in their middle portion and are bisected by a very delicate membrane known as Hensen's median membrane. Between and surrounding the myofibrils there is a fluid substance or sarcoplasm containing interstitial granules of fat droplets and glycogen. Muscles are divided into two types. *Red muscle fibers* are, in general, small in diameter. They contain an abundant sarcoplasm with poorly developed transverse markings and distinct longitudinal striations. The nuclei of these fibers are scattered throughout the substance of the muscle. *Pale or white muscle fibers* have a larger diameter and contain scanty sarcoplasm but have better defined transverse striations. The nuclei lie near the sarcolemma. Most muscle bundles are a mixture of red and pale fibers. The diameters of the fibers in different muscles vary in size from 10 to 100 mu. The endings of both sensory and motor nerve fibers can be identified in the muscle fibers by the use of silver stains which have a selective tendency to stain the nerve tissues.

The sensory nerve endings can be seen as free endings in muscle tendon and connective tissue. The fine ramifications of these fibers end in small varicosities. They also terminate around muscle spindles which are slender bundles of a special type of striated muscle fiber imbedded within the body of the muscles. A muscle bundle contains several of these spindles which receive both sensory and motor nerve terminations. The nerve endings form spirals or rings around the muscle fibers and terminate as bud or leaf-like end structures. The motor nerve, after repeated division into smaller branches, finally loses its myelin sheath as it enters the sarcolemma of the muscle fiber. The naked axis cylinder then ramifies into an elevated structure 40 to 60 mu in diameter called the motor end brush or plate. It consists of a granular mass of what may be modified sarcoplasm containing muscle nuclei. The neurofibrillae in this mass terminates as twigs with knob-like expansions or loop endings. This structure is of great physiological significance. Each motor neurone in man is estimated to supply about one hundred muscle fibers.

PHYSIOLOGY

The anterior horn cell is stimulated by impulses that arise in many parts of the central and peripheral nervous system. The resultant discharge of the anterior horn cell down the motor nerve to the muscle is a composite impulse of a complex nature. The contraction of the muscle produced is likewise a complex phenomenon which in addition to a primary movement carries components which

subserve a number of functions such as the maintenance of posture, fixation of joints and regulation of tonus. A disease of the anterior horn cell leads to disturbance of function of a severe degree. An analysis of the various impulses acting upon the anterior horn cells cannot be reviewed here.

Anterior Horn Cell. It has been difficult to study the function of the anterior horn cell as an individual unit. Studies that have been made have led to the conception that these cells can discharge nerve impulses at either a high or low frequency which determines the degree of contraction of the muscles they innervate. It seems that the degree of activity of each motor unit can be finely graded. If this is considered along with the duration of the nerve impulses and the number of cells acting at a given time, it is possible to understand the complexity of the muscle contraction considered as a whole. Each muscle usually receives its nerve supply from several spinal segments. A disease injuring the anterior horn cells must involve several segments to paralyze completely a muscle bundle. Since a sensory nerve may send branches to a number of anterior horn cells and since the latter receive nerve impulses from many other regions of the central nervous system, the complexity of spinal cord function becomes apparent.

Perhaps the most puzzling function of the anterior horn cell is its ability to maintain a state of physiological excitation or inhibition. The chemical and physical state of the cell membrane itself may play an important role in this phenomenon. Sherrington has advanced the theory that the nerve impulses that play upon the cell set up a disturbance which he called a "central state." The central state may excite (central excitatory state) or inhibit (central inhibitory state) the function of the cell. This depends upon the type of central state induced by the proper combination and influence of the afferent impulses. Gasser has recently made studies that help to explain the "central state." He found that a subnormal state of responsiveness previously described in excised nerves by Graham also is present in the spinal cord and corresponds to a period of positive potential. He believes that the internuncial circuit neurones essential for certain reflexes are made subnormally responsive by previous impulses. Any explanation of the mechanism called "inhibition" at present is theoretical but the conception is essential to explain phenomena observed on the nervous system in both the experimental laboratory and the neurological clinic.

The Peripheral Nerve Fiber. Much more is known about the physiology of the nerve fiber than about the anterior horn cell itself, since it can be easily isolated and studied. The outstanding physiological property of the nerve fiber is its ability to conduct a nerve impulse. Normally it receives its stimulus from the nerve cell, but a nerve impulse also may be set up in the nerve fiber itself by an electrical, thermal, chemical or mechanical stimulus. This shows that the nerve fiber has another property of protoplasm besides conductivity—namely, excitability or irritability. The nerve impulse is a change of state produced in the nerve when conduction is occurring. The excitability is measured by the strength of the stimulus needed to initiate an impulse. One of the most important phenomena associated with the passage of a nerve impulse down the nerve fiber is the action current. This is a wave of negative electrical potential which occurs at the point of origin of the nerve impulse and spreads out equally in both directions from that point with a velocity equal to that of the nerve impulse. The action current must not be confused with or considered the nerve impulse itself. It is only an electrical state which accompanies the nerve impulse. Just what the nerve impulse is remains unknown. Bernstein advanced the theory that the surface layer of the nerve fiber is in an unstable state of chemical equilibrium. When a given area of this membrane becomes active the surface layer becomes more permeable and ions stored up under pressure leak out. This disturbance then passes on to the next segment, the impulse set up being propagated by changes in the fiber itself and the area which has allowed an impulse to pass soon is restored to its previous equilibrium with the migration of ions back to their former position. A number of amplifications of this theory have been advanced since that time. If the nerve fiber is injured, a negative current of injury is set up and this area is not influenced by an impulse set up elsewhere. In general, the intensity of a nerve impulse is proportional to the degree of electrical change. The impulse once generated is conducted down the nerve with undiminished intensity. The intensity at a given point may be reduced or stopped by the local application of alcohol, narcotic drugs or other noxious substances, but if the impulse gets through the narcotized zone it rises to its former intensity. The intensity of the impulse is independent of the strength

of the exciting stimulus. Once the latter is adequate to induce a nerve impulse (i.e., threshold strength), the nerve impulse set up is of maximum intensity. This fact led to the so-called "all or none" law. After a nerve impulse is set up there is a refractory period in the nerve fiber which lasts from one to three one-thousandths of a second during which no stimulus regardless of its strength can induce a second impulse. This "absolute refractory period" is shortened by a rise of temperature and is lengthened by a continuous stimulation for ten to fifteen minutes. Following the absolute refractory period the nerve fiber will not respond except feebly to a very strong stimulus for another 0.010 seconds. This is called the relative refractory period. Therefore, the nerve fiber is refractory to some degree for about 0.013 seconds. The velocity of the nerve impulse is proportioned to the diameter of the nerve fiber, being most rapid in those of largest diameter. Ordinary mixed nerves have fibers which have been divided into four types depending on their diameters. The largest fibers respond to the lowest threshold stimulus strength, conduct the impulse most rapidly and have the shortest refractory periods. Only the largest fibers come from the anterior horn cells. The nerve impulse in man has a velocity of 30 to 90 meters per second.

The subject of chronaxie has an important place in neurophysiology and is very important in understanding the principles of electrodiagnosis and therapy. The effectiveness of a stimulus depends not only on its strength but also on the time which it is allowed to act on the stimulated tissue. Chronaxie is a term which is used to express the intensity and the time that a stimulus must act to produce the desired activity in the tissue studied. The chronaxie is determined by first measuring the weakest galvanic current that will set up activity in the stimulated tissue after an interval of time. A weaker stimulus must not produce activity regardless of how long it is allowed to act and a stronger stimulus will react in a shorter interval. This value is called the rheobase value and is measured in volts. The chronaxie is the time that a current which is twice this rheobase value must act to produce activity (i.e., contraction). It therefore is a measurement of the excitability of the tissue. The chronaxie of nerves and muscles varies in different parts of the body as well as in different individuals. The chronaxie of a motor nerve always is about the same as that of the muscles it supplies. A short chronaxie is present in nerves with a short refractory period and quick rate of propagation (i.e., fibers with large diameters). Nerve fibers of narrow diameter have a longer chronaxie, and smooth muscle a longer one than striated muscle. If the chronaxie of a nerve and its muscle differ by 200 per cent, stimulation of the muscle via its nerve is ineffective although it may still respond to direct stimulation. The chronaxie is increased by fatigue, by such drugs as curare and by disease. It is decreased by adrenaline in a fatigued muscle.

The Skeletal Muscle. Exactly what a muscle does when it contracts is only a partially solved problem. The functional unit of the muscle is the "sarcomere" which is that portion of a muscle fiber that lies between two membranes of Krause. Apparently the myofibrils are the contractile elements in the muscle and when the muscle fiber contracts the hyaline substance of the light part of the myofibril passes into the dark band portion making each sarcomere shorter and broader. At the same time the sarcolemma can be seen to bulge between the successive Krause membranes as they come closer together. Some believe this forces the sarcoplasm from between the dilated myofibrils. Others think that fluid passes from the sarcoplasm into the myofibrils.

Although the "all or none" principle is of fundamental importance in the reaction to stimulation of a single nerve fiber, the peripheral nerve going to a muscle contains many branches which supply many muscle fibers. It is possible theoretically that a single stimulus could excite only one motor nerve fiber. This would give the muscle a contraction of a certain fixed strength. If the stimulus strength is increased, more fibers are stimulated and a greater contraction results. Muscle physiology, therefore, usually is considered in terms of a nerve-muscle unit. The muscle after stimulation by an electric current has a refractory period of one-thousandths of a second. A second stimulus may produce a contraction in either the contraction or relaxation phase of the preceding contraction. This phenomenon is called "summation." It may produce a contraction greater in degree than that produced by the original stimulus. If the stimulus is now repeated at shorter intervals, the increasing summation produces contractions which fuse mechanically to give the effect of a continuous contraction. Stimuli of from ten to twenty per second produce what has been called "sub-tetanus."

At higher rates such as sixty per second "full tetanus" is produced, giving the muscle a much greater tension or pull. These changes are produced by a stimulus of a constant strength. If muscular contraction is considered in its normal physiological sense, it is produced only by stimuli which arise from the anterior horn cells rather than from the electric current. These cells apparently can discharge stimuli at a variable rate to produce a variable degree of tetanus. The tetanus produced follows stimulation after some delay so that the duration of the motor neurone discharge also is important. The number of anterior horn cells discharging at a given time as well as the degree of activity of each motor unit may account for the finely graded response that is produced. A low rate of discharge producing a partial tetanus may be compensated for by an asynchronous contraction of muscle units giving the desired pull. If a muscle is stimulated by a rapidly repeated electric current, contractions occur at the onset with increased magnitude (treppe). The early contractions may be beneficial to the muscle and increase its irritability. This may be accompanied later by a decreased relaxation producing the so-called early contracture. With still further stimulation the muscle gradually loses its irritability and degree of contractability, giving the reaction of fatigue. At the same time contracture occurs so that the muscle is in a state of increased tone with a loss of shortening. This reaction is seen in tonic muscle spasm or cramps. A muscle is capable of two kinds of contraction, the ordinary shortening contraction and a slower contraction called "contracture" or "tone."

Electrical changes occur in the skeletal muscles just as in the nerve fibers. There is a diphasic action current produced that accompanies the contraction of the muscle. Studies of these action currents have made it possible to determine the rate of stimuli occurring in muscle activity, the stimuli being in the nature of an asynchronous volley of impulses. The action current in different motor units are out of phase with each other so that rapid and irregular contractions are occurring in different parts of the muscle at all times. During complete relaxation of the muscle no action current may be recorded. As voluntary movement begins the action current becomes progressively more rapid. With a progressively stronger contraction more action current is recorded, indicating that more motor units are acting. These finally become so complex that it is impossible to pick out a pattern. Voluntary movement seems to depend on the controlling of the *frequency* of the motor discharge and the *number* of motor neurones in action. The "all or none" law in voluntary muscle under conditions of natural stimulation is of theoretical interest only because a variable strength of stimulus from the anterior horn cells is not present as in artificial stimulation with the electric current. The reaction to the stimulus is modified by factors in the muscle such as its initial length, temperature, degree of blood and oxygen supply, and so forth. As stated above, each afferent neurone is in contact with many anterior horn cells which in turn receive stimuli from many regions, giving what Sherrington termed the "principle of convergence." These factors are of importance in reflex action. Sampson Wright states that no single anatomical nerve in the limb can elicit by reflex action full maximal contraction of the muscle. For example, if the internal saphenous nerve is stimulated, it is found that a hip flexor contracted 100 per cent, a knee flexer 50 per cent and an ankle flexor 88 per cent. Therefore, the afferent nerve connects up with a certain restricted group of motor neurones so that if we should call all the flexor motor cells the "flexor center" this afferent nerve can employ only a fraction of them. In other words, it "fractionates the center" and the fraction of one overlaps the fraction of another. This illustrates why reflex mechanisms can produce reactions which apparently are so complex. It is beyond the scope of this review to consider other reflex mechanisms such as the tonic neck and labyrnthine reflexes or some of the so-called associated automatisms that arise from the midbrain and basal cerebral ganglia. Nevertheless they modify the complex function of muscle when considered as total motor patterns.

Muscle Tone. Muscle tone is far from being a simple phenomenon. Part of it depends upon reflex contraction produced by the stimulation of the afferent nerve endings arising in the muscles themselves or in their tendon sheaths. Another source of tone arises from stimuli from the vestibular and midbrain reflex centers. Muscle tone seems to be present in both the red and pale muscle fibers. It is thought to be produced by a slow asynchronous discharge from the anterior horn cells producing a partial tetanus which is economical and capable of being maintained for a long period of time. Muscle movement is

produced by a synchronous discharge giving a powerful tetanus, but this type of function is more expensive to maintain and is, therefore, of short duration.

Diseases attacking the final common pathway decrease muscle tone. This is true also of conditions which interrupt the afferent side of the reflex arc such as tabes dorsalis. On the motor side any disease injuring the anterior horn cells (i. e., poliomyelitis), the peripheral nerves (i. e., peripheral polyneuritis), or the muscles themselves (i. e., progressive muscular dystrophy) produce a diminution or loss of muscle tone. The tendon reflexes obviously are diminished by the same type of injury or disease. Muscle tone likewise is diminished by certain conditions arising elsewhere in the nervous system. In diseases of the cerebellum and in chorea minor there is reduced muscle tone involving total muscle groups or the whole musculature. Parietal lobe lesions may cause muscle hypotonia. In states of shock to the central nervous system from an injury, vascular accident or increased intracranial pressure (i. e., tumors), reduced tone of the muscles may occur, but this is only a temporary change in most cases. Reduced muscle tone also occurs in disturbed metabolic or toxic states such as cachexia, in chronic infection and in glandular diseases like Addison's disease.

Muscle tone is increased in any disease or lesion that releases the reflex arc from the inhibition of the higher nerve centers, thus permitting it to revert back to its primitive reflex function. This is seen in reflex arcs below the level of a spinal cord compression from an injury, new growth or some other type of disease process. In such cases a light blow on a muscle tendon will produce a brisk, vigorous reflex response over the corresponding reflex arc. Likewise, a stretch of the muscle will induce through its afferent nerve fibers a strong muscle contraction (stretch reflex). In the muscles of the calf such a stretch by dorsiflexion of the foot may induce the rhythmic contraction known as muscle clonus. Release of the inhibition of the higher nerve centers in the brain by a lesion in the long descending voluntary motor tracts (pyramidal tracts) will produce the increased muscle and reflex tone familiarly seen in spastic hemiplegia or in cerebral palsy. Increased muscle tone is present in Parkinson's disease or in the Parkinsonian syndrome, but the exact mechanism of this is not known. Lesions of the brain stem may disturb the higher reflex arc centers. This disturbance resembles experimental decerebrate rigidity in animals. Some metabolic disorders such as parathyroid tetany and the effects of certain poisons like strychnine increase the muscle tone. Experimental evidence is not conclusive but suggests that stimulation of sympathetic nerves decreases fatigue in skeletal muscle. It apparently does not affect resting muscle or influence muscle tone.

What is called voluntary muscle movement is a complex act. We can perform a movement with our muscles and are aware of what it does because of muscle, joint and tendon sensation. Many components of a voluntary movement are not conscious or voluntary at all and many motor acts such as walking which have to be learned at first, later become more or less automatic and require no conscious effort. The numerous muscles which take part in a voluntary movement follow a pattern of reaction. The principle action is brought about by a group of muscles called the "prime movers" or "agonists." The smoothness and gradation of this movement is controlled by another group of muscles which act in the opposite direction at the same time. They are called the "antagonists." These muscles which facilitate and stabilize the prime movers receive nerve impulses by what has been called "reciprocal inhibition." It permits relaxation to just the degree necessary for smooth action. Another type of action taking place is the contraction of "synergistic muscles" which tend to fix or stabilize a joint for a given movement. Other muscles carry out "movements of cooperation" which precede or accompany the action of the prime movers. An example of this is the holding to the railing in climbing up and down stairs. The necessary muscle movements that assist in carrying out a major activity such as swinging the arms in walking or the muscles that aid in maintaining posture all illustrate the complexity of muscular activity and are all included in the term "motor pattern."

Chemical Factors. Knowledge of the biochemical processes taking place in the function of nerves and muscles is advancing so rapidly that the student must read the literature constantly to keep abreast of the subject. Some of the material in this review already may be subject to modification.

An important phase of muscle physiology has been developed by a better understanding of a chemical substance known as acetylcholine. This substance is formed and liberated at the terminal nerve endings of the parasympathetic nervous system, at all gan-

glia which receive preganglionic autonomic fibers and at the endings of the motor nerves in the muscle. It is the chemical transmitter of the nerve impulse to the skeletal muscle at the myoneural junction (i. e., at the motor nerve ending) and is essential to the muscle contraction produced by the stimulation of the nerve impulse. If the drug is injected into a blood vessel going to a muscle which has been denervated it will produce a contraction equal to direct stimulation. The action of the drug is transient, because it is rapidly converted from its unstable form to choline (which is only one-one hundred thousandths as potent) by the enzyme choline esterase found in blood and tissues. The effect of acetylcholine is enhanced by the potassium ion. Acetylcholine has important pharmacological properties which can be demonstrated by experimental methods. It stimulates the excitor cells of the autonomic system to discharge nervous impulses. It mimics stimulation of the parasympathetic nerves by a peripheral action and causes a peripheral vasodilatation of some blood vessels by a direct action. It alters the circulation by lowering the blood pressure, decreasing the heart rate, and producing dilatation of the peripheral blood vessels. Its effect on the flow of tears and saliva and on increasing intestinal and bladder movements can be observed when used in the treatment of many conditions by iontophoresis. Atropin abolishes the effect of the drug and is its physiological antidote.

Some of the biochemical changes that accompany or follow muscular contraction should be mentioned. Skeletal muscle is composed of water, protein, fat, glycogen and phosporous-containing compounds called phosphogen (creatine phosphate) and adenyl-pyrophosphate. It also contains a small quantity of a histidine related compound called carnosine. During muscular activity the muscle loses glycogen and phosphogen and has an increased content of creatine inorganic phosphate, lactate and hexose monophosphate. There is a liberation of lactic acid and heat, the former substance produces a change in the hydrogen ion concentration of the muscle towards the acid side. In healthy muscle some of the lactic acid is removed by oxidation to form carbon dioxide and water or is converted back into glycogen. Some believe that other constituents of muscle such as phosphogen and adenyl-pyrophosphate also may be resynthesized. These chemical reactions are very complex and not completely understood. They are the result rather than the cause of muscular contraction. The cause of fatigue is not known. The substance urea found normally in the blood and urine has been shown by chemists to be related to an alkaline compound called guanidine which is related to creatine (methyl-guanidine acetic acid) and to creatinine, the anhydride of creatine. These substances normally are found in the blood in small quantities. It has been estimated that an adult has in his body about 90 grams of creatine, 98 per cent of which is found in the skeletal muscles as creatine phosphate (phosphogen). The blood contains about 10 mg. of this substance per 100 cc. The origin of creatine is unknown but it is known to rise steadily in amount from the fetal period up until the adult age. Creatine is not excreted in the urine in normal adult males but it constantly is present in the urine of children up until puberty and in women during pregnancy. It also is present in the urine of women intermittently at other times for some unknown reason. This compound is of clinical importance because in diseased conditions of the muscle, the muscle has a low storage power for this product and it is excreted in the urine. It also appears in the urine when the muscles break down from other causes (starvation, fever, diabetes, undernutrition and exophthalmic goiter).

(Editor's Note: This is the first part of an article by Doctor Steegmann. Part II will appear in the next issue.)

The Third Side of Growth

Earl D. Bond, M.D.

Life itself, as such, depends upon growth, and certainly nothing is any more important. That is the reason for this discussion on the three sides of human growth.

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No doubt most people are generally sure that they are going to grow up. They take it just as a matter of course. Most small boys think, "Just give me twenty years or so and

I'll be grown up like my father—or like the policeman," and they just go ahead taking for granted that that particular father or that particular policeman is grown up. Let us consider a few examples on the different sides of this group.

In the first place, a fullback on a winning team is a splendid player and certainly first rate physically if ever anyone was—six foot, two hundred pounds, and considered to be graded high intellectually. On the other side of his life he behaves as you would expect a small boy to behave; that is, when a play goes wrong it is always the other fellow's fault; if he fumbles, the center's pass was poor. He swells up when he is praised and sulks when the coach criticizes him, and off the field he is completely under his mother's thumb.

Even this morning someone in my office said, "I'm surprised to find that even some intellectual people aren't grown up." It has always been interesting to see how far a person could grow in development on the intellectual side and yet not advance at all in some other respects. Probably it is because of the contrast that we notice many very intelligent people who have no sense at all.

There is the story of an Oxford University Fellow who was a great scholar. He would spend a great deal of the day waiting for a rival to appear. His room was directly over a great stone arch and his rival had to go under the arch. This first man would lean out of the window and spit down on the rival and would rush across the room and spit at him again on the other side of the arch. And yet here was a scholar, in the intellectual sense grown up to the age of sixty years; but on the other side of his life he was acting like a five year old.

For example, there is the mother who simply lies down on the floor and beats her heels on the carpet when the children do not do what she tells them to do. The executives who always want what they want when they want it. A college man says, "I have to be coaxed to do everything. I want things very much and when I get them I don't want them any more." In other words he is like a child who wants a plaything and as soon as he gets it, looses interest.

A physician once said, "The depression has shown up the average American as a superstitious, immature being, crying for the lost lollypop of prosperity and not able to do anything useful about it."

In business, employees and employers fail, not because they are not bright enough, not because they are not physically able, but because they are emotionally undeveloped. They are lazy, drink too much, or are forever getting into rows with their fellow neighbors, or they are unreliable. A Boston restaurant gave applicants for waitress positions a kind of quick intelligence test and then the manager hired all the girls who failed because he said then he would get someone who would be reliable.

It is fair to say that no one can claim to be grown up whose emotions are not up to the twenty-one year old stage. It is really worth a good deal to stand off and look at this idea, see what is behind it and see how it applies to yourself and your friends.

Here is a general view of what happens. To grow physically probably all that the average person needs is time and the proper foods. Of course, when something does go wrong physically it goes very wrong. To grow intellectually we have the help of a school system that is graded. It is graded by professionals and each lesson is carefully planned with reference to every other; that is, the first grade lessons are planned with respect to the eighth grade and a person could go very regularly up the school ladder step by step from kindergarten to college. Of course, there are lots of troubles with the school system, but after all, it is a system.

However, to grow emotionally is a more difficult task and we do not have so much help. Ordinarily there is no graded course of lessons, and the lessons which are available usually are in the hands of amateurs, parents or older children who may not be very far along themselves. There is no easy test nor examination that you can apply as in school or in physical development. It is a difficult and hard proposition, and the only test is that of life itself. This third side of growth, of course, is my main topic, and some light on it and some beginning of gradations come when we can see that after all there are some stages in emotional development, even if they are not the grades of the school system.

We begin at infancy to see how these stages come along, because persons in infancy are continually dependent upon parents, and should be; there is no other solution for the human baby. Sometimes it might help if people could see a guinea pig when it is a few hours old. It is surprising what a guinea pig can do. Put it in a pail of water and it can swim as though it has been swimming

for years. It is almost an adult when it is a few days old. In a few hours it can do so many things that its parents can do. But as Doctor Campbell said in Boston, "After all, the guinea pig's personality is limited—it doesn't have far to go." A baby ought to be selfish—no one objects to almost complete selfishness in a baby. It reminds me of a woman patient who said not long ago, "I intend to make everybody do things for me and I don't intend to do one thing in return," as a cross section of her babyishness. She was a woman of thirty intellectually and physically, but as to emotions it left her in the two year old stage.

The next step, and often a pretty big jolt, comes during the age of three to five; frequently a new baby comes into the family and the older child has to adjust himself to a sister or brother. There is some development in character for a child to meet that situation properly. Perhaps no one minds jealousy when such a situation is not met properly in a three year old. However, jealousy that is dominant in an older person reveals him as in this age from three to five. Anyone whose life is governed by jealousy has not gone beyond the fifth year of emotional development. There is the case of a girl, a college graduate of about thirty, who is still governed by jealousy of a younger sister. When she was about four she had prayed very hard for a baby brother and instead twins arrived, one of whom was a baby brother but one was a baby sister. The fact that her mother had to give two-thirds of her time to the twins and only one-third to her has been the governing factor in her life ever since.

In this stage there is a wonderful psychological development. People ordinarily learn more at this time than they do at any other time in their life. There is wide awake curiosity, individuality, imagination, and the awakening of new emotions. They say that we are never able to learn again as rapidly as we were at the age of four.

Then comes common school age. The ages of six to twelve seem to be made for learning how to get on in society, for learning how to get on with other children. Most children want to be like others. They do not like to be different, and most children of this age believe what other people tell them.

And then comes adolescence, a complete contrast to this late school age, when each boy or girl wants to be an individual. In one way it is a kind of throw-back to the four and five year old stage. He wants to be understood as an individual, wants to stand out instead of being considered with a group, perhaps wants to hero-worship someone of the same sex. This is the time for romance and experiment and to begin wondering whether older people know very much about the things they discuss.

At last, just at twenty-one, to get some conventional age, there should come a complete independence, just the opposite of a babyish dependence. A person of twenty-one should not be more dependent upon the parents than the parents depend upon that person. Reaching this age emotionally probably depends upon an unselfish falling in love and an ability to start a new family.

These stages do not seem hard to see. In one way they seem very evident, but many parents seem so surprised and hurt when a child of theirs grows from one stage to another. They want the child to stay back and not, just when they had grown accustomed to one stage, go on to another stage. It is hard to tell how much of the family trouble of the world would be solved if parents simply accepted the fact that a child has to grow up and not always stay the same.

In summing up these stages we come to another question—when you arrive at the top of this third side of growth when you get into the circle of emotional maturity—what are the signs and symptoms that would distinguish you? Of course, they cannot be numbered, but we might as well say that there are ten. If we say that there are ten points which make a grown-up person we begin to have a list of something by which we can rate people. If there were such a thing as an E. Q. it would be an emotional quotient, just as an I. Q. is an intelligence quotient.

I believe the first point would be independence. The ability to stand on one's feet and of course manage not to keep stepping on other people's toes and not let other people step on one's own. An independent person could take orders from a person higher up and give orders to a person lower down. Such a person could take advice and criticism without being hurt too much by another. He must decide his own personal affairs for himself, and he must know how to assert himself at the right time.

The second point, perhaps, is the ability to love someone else unselfishly, to have some vivid interest in the life of someone else, to cooperate with friends. You would see such a person entering into marriage with the idea,

"What can I give to this marriage?" and not, "What can I get out of it?" One of the Hollywood motion picture stars the other day said that she wanted to be a queen, and apparently she had married five or six of these "bogus" counts—European "down and out nobility"—in this effort to get something out of marriage. She, of course, had no notion of taking on any of the responsibility of a queen. She just had a six-year old idea of what there was in queenship. None of these marriages lasted, of course, because she could not get out of them what she desired. When you see this group of Hollywood stars, married over and over again, you must realize that you are dealing with people who on one side of their life are still ten year olds, and you cannot expect them to be any happier.

The third point is the ability to be somewhat moderate in mood, not to get more excited than the occasion warrants, not to throw temper tantrums. One man of my acquaintance gets a temper tantrum every time the traffic light turns red. He seems to think it is a personal insult to him. You can compare people like this to a four or five year old. In difficult situations it is a sign of being grown up to go ahead somewhat cooly, without fits of blind anger at least, and always look ahead. Someone said, "Even devotion is like steam heat; you can get too much of it."

The fourth point is facing problems honestly without deceiving oneself too much. Of course, if a football team is considering a game with its greatest rival it would be sensible to find out what the strength of this other team was and also what its own weakness was. It would be foolish for the team to boost itself up to a peak of over-confidence. This has become the habit of a great many individuals. "What are my weak points and what can I do to brush them up?" One man whose business was very shaky, just ahead of bankruptcy, bought himself a very expensive car and made himself believe that everything was all right as he rode around in style. He said, "If I can afford this car, everything is all right." He refused to tell his wife that anything was wrong. He lived in what has been and always will be called a fool's paradise. We should face difficult facts in order to size them up. We should even be able to see faults in people we love. It is possible—although many people do not seem to believe this—to dislike many traits in people of which we are fond. Just loving a person very much does not need to blind us to the faults which he or she has. Certainly personality studies for vocational guidance are a big point in the right direction.

Point number five is the ability to look ahead and plan for the future, plan for tomorrow as well as for the important things we are doing today. My best bad example is a very attractive and brilliant young man who got a job in which he did splendidly for nearly two weeks. In fact the secretary to the employer said, "Here's a man who may be promoted to be general manager some day." Saturday noon he was to be given his two weeks' pay of about $80, and on Friday afternoon the cashier gave him $10 to pay a debt in a neighboring shop. This young man went off with the $10 in his pocket and lost the $80, getting himself into lots of trouble. There are evidently many people in the world who do not seem capable of fitting future concern into the present situation.

Another illustration is the mother who tries to keep her troublesome child quiet for the moment without considering what is good for the child in coming years. A man takes alcohol for a momentary relief, forgetting that alcohol can destroy him later. But probably nothing indicates an adult person better than a habit of looking ahead, being consistent, and joining the present with the future in good habits which have a lasting value.

Point number six: a person well grown can fall back on good habits in time of trouble. When he makes a mistake he says, "That's my mistake and I must learn better." He keeps learning by experience. It is possible to illustrate this point with examples on the wrong side but I would rather not emphasize that wrong side too much.

Number seven: a sound conscience by which we mean a well developed one, one which continues to grow. A good conscience, for instance, is a sound conscience and lets you have a good time on your day off and does not come around to nag you for neglecting your work. It knows that there is a time for work and a time for play. Overconscientiousness is a trait which is childish because it is built on some childish misunderstanding. Overconscientious people are always keeping a house so clean that no one can have any fun in it, and after all they think there is something wrong in having fun anyway.

None of the religions with which I am familiar ask for overconscientiousness. They do not ask for conscience in the wrong place. Some ministers have said that what we all

need is a religion that would bounce. Conscience, no doubt, is meant to be like a brake on a car, and it should be a very powerful one; but a brake on a car is only to be used once in a while. Stepping on it all the time destroys power and makes it simply a waste. Many couples have told me that their son was a model child but "he never had any fun."

The eighth point is tolerance, which comes from a feeling of security and self-respect. The tolerant person would be frank, likes to talk with people who disagree with him, is willing to share freedom with other people who have their own peculiar ideas. If there is anything which marks a tolerant man it is the ability to accept criticism, advice and help and especially the willingness to accept change and growth. The tolerant person can work easily with others, as leader or follower. He is a good team player.

Number nine: a grown up person naturally would take responsibility in increasing doses with increased age, responsibility for his own life and work and for his own decisions. At the Child Guidance Clinic a ten year old boy burst out, "I would rather be a baby—you get more service and people don't expect so much of you."

One seventeen year old boy, a patient of mine, was doing some things he wanted of which his parents disapproved. In an effort to get him thinking a little I reminded him that he would be twenty-one quite soon and then he could make more decisions for himself. I never saw such a frightened look on anyone's face as he replied, "I can't bear to think of taking on any responsibilities. I don't want to be twenty-one. I don't want to think about it." In the short run it is easiest to hold on to apron strings, to get out of work and avoid responsibility. In the long run it leads to unhappiness and to being left behind on this third side of growth.

Number ten: a person should be focused on something, should be consistent. One part of him should not be going south and another part north. If that happens we say that a person is going to pieces, which is a remarkably good expression. To be happy and efficient we have to focus on some goal which unites all our energies, and that goal should be something outside of ourselves. That is why a religious process is a force to hold people together, to integrate them. On the other hand we cannot be good on Sunday and bad all the other days. We cannot work hard and drink hard at the same time. We cannot focus on business and on sports. A balanced life would put the main things first and make other things secondary next in line: Concentrate on business and use athletics as a rest and enjoyment.

It is easy to see that when we try to pick out ten points they do not include everything and yet they easily overlap.

If you find a man who is governed by jealousy, he has reached the emotional age of three. This is perhaps as handy a way as any other to grade some people. If he is incurably romantic, he is about fourteen years old. If he believes implicitly what older people tell him he is pretty young. If he is boastful, he is about seven, and so on.

In growing up and in getting civilized it is unfortunate that nations fall so far behind individuals. Nations are still governed by these childish, almost barbarian, ways of getting ahead. They are like average tramps or like gangsters, and gangsters in turn are like boys or bullies. This whole country, of course, was very childish at the time of the Spanish War. I remember seeing the reception for Admiral Dewey when he came back from Manilla and at this time the whole country was too enthusiastic, seeming to have had no judgment left at all; for while he deserved some of that reception he did not deserve it all. About two weeks after that he put a house in his wife's name without thinking too much about it, and then the whole United States turned against him and paid no more attention to him; just as fanatically turned on him as they had poured too much adulation on him before. Almost all nations grab everything they can get.

If I had been asked a year ago what nations were really growing up I would have said Sweden and Finland. Let us see how many points they have: They have been independent, facing the facts of hardness and cold in their own countries; they have planned ahead wisely; they have focused on getting good things in life for their people.

So to continue growing up on the third side of life as it could be done would mean freedom and happiness to all individuals and to all nations, and really it seems like the one hope of the future.

Treatment of Injuries to the Knee Joint

Edward D. O'Donnell

The knee joint frequently is injured because of its relatively weak structure and its exposure to traumata. Normally, flexion and extension are the characteristic motions of the knee, but a few degrees of rotation and lateral motion may occur when the knee is flexed. The structures which prevent other motions, such as excessive rotation or lateral motion, are not very strong. It is interesting to observe that the muscles controlling the knee often are neglected from a developmental point of view. Many forms of exercise aim directly at development of the arms, the trunk and the shoulders, but frequently in these forms of exercises the legs are neglected.

The use of the legs in ordinary walking and running may do very little for the muscles which control the knee because the force of gravity and the momentum of the leg, brought about by the hip action, carries the knee through its range of motion with very little muscle action. Other forms of exercise, such as bicycling, rowing and squatting, are required to obtain the maximum development of these muscles.

One of the most common injuries of the knee is a sprain or tear of one of the lateral ligaments. The internal lateral ligament is more likely to be injured than the external ligament, because the force which is directed against the side of the knee will have a tendency to buckle it inward, thus stretching and tearing the ligament on the medial side. Injury to a lateral ligament may be accompanied by injury to other structures, but it is not likely that the cartilages or crucial ligaments can become torn or displaced unless there is first a tear of one of these lateral ligaments.

Another common type of injury to the knee joint is injury to the semilunar cartilages. This is almost invariably associated with a tear of one of the lateral ligaments. The cartilages either can be displaced as a whole or torn so that only a part of the cartilage is loose within the joint. This then acts as a loose body and tends to bring about a locking of the joint by being introduced between the smooth articular surfaces. Injuries to the cartilage can occur without locking of the knee, but locking is the most dependable sign of cartilage injury.

Another injury is one involving the cruciate ligaments of the knee. These intra-articular ligaments act to prevent hyperextension of the knee beyond the straight line and to prevent excessive flexion. The injury is more often to the anterior cruciate ligament, which prevents hyperextension, than to the posterior cruciate ligament, which limits flexion. Let us assume that a definite tear of the anterior cruciate ligament has occurred in a knee which can be hyperextended several degrees beyond the range of normal. If the tear is complete, hyperextension can be accomplished without pain; if partial, attempts to hyperextend the knee will bring about great pain which cannot be localized by the patient to any particular area but is described as being in the middle of the joint.

Injuries to the tendons of the muscles around the joint are relatively rare, but occasionally the patella tendon may be torn. Also, very rarely, one of the tendons of the hamstring muscles may be torn, or combined injuries of two or more of the above can occur. The treatment of knee joint injuries in general depends upon the nature and extent of injury as well as the length of the time following injury.

Early treatment for an injury to the knee would consist of rest and adequate protection to prevent excessive weight bearing, and motion as outlined by the physician in charge. If there is a large amount of effusion, the use of cold compresses is of greater value than the use of heat for the first day or two, unless the heat is applied to the muscles of the upper third of the thigh in order to dilate the blood vessels and thus promote absorption.

About the second or third day, gentle massage of the muscles of the upper third of the thigh may be started, but one must be careful to be above the area of effusion. A light stroking massage is given, starting at the

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Physical Therapist, Yale University Department of Health, New Haven, Conn.
For many of the ideas incorporated in this article the author is greatly indebted to Drs. W. M. Phelps, M. A. Stevens, Philip D. Wilson, John R. Cobb, W. S. Perham and Dennis S. O'Connor, with whom he has been associated.

distal portion of the area to be treated in order to empty the blood vessels and lymph channels and promote absorption. At this time, also, muscle contraction of the quadriceps femoris should begin. Alternate contraction and relaxation of the muscle should be done an increasing number of times daily to aid in clearing the lymph channels by active muscle contraction. This procedure also is of value in lessening the atrophy of the muscles of the thigh following injury and immobilization of the joint.

At this time, if the swelling is disappearing rapidly, there is considerable value to the joint in the use of any type of heat which can be applied conveniently. Care should be taken that the heat is not too intense and that it is applied for short periods only as the injury may have caused considerable damage not only to the joint but also to the smaller vessels. Too much heat, too intense heat, or too long-continued heat applied to these vessels may bring about sufficient dilatation to cause further bleeding.

After the end of the first week or ten days, the second stage of treatment may be said to have begun. At this time, or earlier in less severe cases, active motion may be started. It is not always possible for this to be accomplished, due to the immobilization and perhaps pain or apprehension on the part of the patient; therefore, active motion at this stage is given as active-assisted motion and should be carried out only through a small range pain-free motion with the patient supine. The leg should be held carefully by the physical therapy technician in such a way that there will be no lateral motion in the joint during the active-assisted motion. This is likely to occur if the knee is not held in the vertical position but is allowed to be slightly rotated externally or internally, for gravity will act to produce a strain in a lateral direction to one side or the other. The range of motion and the degree of activity on the part of the patient should be increased gradually. Between treatments, in this stage, many physicians advise that the plaster cast shall be continued for some time in severe cases, while in mild cases they recommend that felt strips and longitudinal adhesive strapping be applied. These straps should be long enough and extend far enough above and below the knee to act effectively as a supporting dressing for the knee. In many instances the tendency is to make them too short or to place them around the knee at right angles to the leg which is very much less effective. As the patient walks with crutches, he is able more easily to obtain desirable motion in the knee without excessive weight bearing when adhesive and felt strips are used than if the plaster cast were to be continued. The restoration of motion is valuable in preventing atrophy of the muscles of the thigh and diminution in muscle tone.

Later, resisted exercise is substituted for the active-assisted exercise. This is given to increase the strength in the muscles of the thigh, and it should be supplemented by a deeper massage which should include kneading and friction.

When the physician has ordered weight bearing it is well to advise the patient to wear a properly-fitted shoe and not to attempt to walk in a bedroom slipper or a stocking, as the knee will be more stable when wearing a well-fitting shoe.

Treatment by means of massage and resisted motion can be carried out at home by the patient as well as in the treatment room. An effective method of doing this is to have the patient sit on the edge of the table and resist extension of the knee by crossing the other foot over the one on the affected side. In the reverse direction he can resist the contraction of the hamstrings by pulling the leg back against the resistance of the other foot. The patient must be taught in this procedure to be careful that the injured leg is always kept in a straight line and that the diagonal position of the other leg must be maintained. Also, at this stage additional strength of the knee can be brought about through the use of resisted motion in abduction and adduction of the medial and lateral hamstrings since there is a synergistic action between the abductors and adductors and the flexors and extensors of the joint. Treatment should be continued until such time as measurements of the circumferences of the two thighs are equal. It cannot be felt that a knee is entirely recovered until the strength of the musculature of the affected leg is as great as that in the other, and this cannot be so until the measurements on the two sides are equal at equivalent points above the knee.

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The
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Nineteenth Annual Convention

Another successful and profitable convention has just been held. Each year that we meet shows great progress and increased interest in both the business and scientific sessions. Attendance was the largest in our history—over 500—and of these approximately 275 were members. There were delegates from every chapter except two. This, we feel, is of great value because each chapter having delegates is actively participating in the convention and receives stimulus from it.

We now have a total of twenty-nine chapters—an increase of nine chapters during the past year. New chapters were enthusiastic in the benefits derived from organizing and urge that every state having the required five members form a chapter as soon as possible.

Following registration a buffet supper was held in the Empire Room of the Biltmore Hotel. Informal chapter reports were given and also the opportunity to "brag" about successful accomplishments. "A Pageantry of Pools and Scenery Around the United States" (Kodachrome slides) was presented by Richard Kovacs, M.D. Many of these were in color and the quick tour of the United States was very enjoyable. Memoirs of the Eighteenth Annual Convention were revived with pictures of Troutdale-in-the-Pines and its pool.

The first business meeting on Monday was opened by Miss Irene Ashbee who welcomed the delegates and presented Mr. Basil O'Connor, President of the National Foundation for Infantile Paralysis, who told us of the objectives and aims of the National Foundation and their interest in research on the many problems concerning the handicapped, not only in the aftercare but in the prevention of crippling deformities, and in research conducted by scientists throughout the country. It is of great value to all to have research on these problems conducted and coordinated by the National Foundation. Miss Helen Kaiser then welcomed the delegates and members, and formally opened the first business meeting. Committee and chapter reports which are given elsewhere in this issue occupied the entire morning. We recommend that everyone read these carefully as much has been accomplished during the past year which is of interest to every member.

On Monday afternoon a round table on "Cerebral Palsy" was held with Miss Edna Blumenthal presiding. Evidence of the great interest in this problem was a large enthusiastic audience which overflowed into the corridors. The papers given will appear in a future issue of the REVIEW.

Tuesday morning a scoliosis clinic was given at New York Orthopedic Hospital, Miss Emma Schrampf presiding. Here again an overflow attendance was recorded. Particular emphasis was laid upon correction by fusion. X-rays and slides of cases demonstrating preliminary and aftercare were shown. A group of eight cases personally demonstrated the fine results that have been obtained at the New York Orthopedic Hospital.

At the officers' luncheon, Tuesday noon, chapter problems were discussed. This conference is of increasing value as it permits an informal exchange of information relative to particular problems in the chapters. The afternoon and evening were spent at the World's Fair which has been so well described that we have nothing to add. However, we all welcomed the opportunity given us and derived much pleasure from our visit.

On Wednesday the following officers were elected to serve us for the next two years:

President, Catherine Worthingham.
Vice-President, Dorothy Young.
Vice-President, Betty A. Rice.
Secretary, Evelyn Anderson.
Treasurer, Catherine Wallace.

Information concerning other business relative to the forming of an inactive membership soon will be sent to each member. It was voted to substitute the word "provisional" for "junior" in referring to that class of membership. A salary survey is to be conducted by Miss Constance Greene, and each member is urged to cooperate by filling out and returning the questionnaire which will be mailed her. The convention voted to donate $100 to the Red Cross, and a resolution was passed urging the members to cooperate in the Red Cross Roll Call. All details of the business transacted will be sent in a membership letter, as space does not permit a full report in the REVIEW.

Scientific sessions occupied the remainder of the convention time. The programs were exceptionally well planned and diversified. The continued overflow attendance at every session is an indication of the high quality of the papers presented by outstanding members of the medical profession. On Wednesday an excellent symposium on "Arthritis" was held at the New York Post Graduate Medical School, Miss Josephine Rathbone, Ph.D., presiding. Miss Gertrude Beard presided on Wednesday evening at which time two very important papers were presented: "The Pathology of Peripheral Vascular Diseases" by Irving S. Wright, M.D., Professor of Medicine at Columbia University, and "The Treatment of Peripheral Vascular Diseases" by William Bierman, M.D., New York University College of Medicine.

On Thursday morning a round table on "Education" was held, with Miss Margaret O'Meara presiding. Problems on education were discussed informally and it was recommended that a study be made of the content of the courses given by the schools on the approved list. We were fortunate to have Arthur Bowles, M.D., Council on Medical Education and Hospitals, American Medical Association, present to hear our problems and to tell us of their responsibilities and limitations.

On Thursday afternoon, Miss Constance Greene presiding, papers were presented on "Fractures" by Barbara B. Stimson, M.D., Assistant Orthopedic Surgeon, Presbyterian Hospital, New York; "Erb's Palsy" by Robert Lee Patterson, Jr., M.D., Armand Fischer, M.D., and Florence K. Winter, B.S., all of the Hospital for Ruptured and Crippled, New York, and "Electrical Muscle and Nerve Testing" by William Benham Snow, M.D., Presbyterian Hospital, New York.

The banquet, as always, was a gala affair. The entertainment was announced as "Song and Fay, the American Physio Way," staged by Miss Frances Dunlap, a talented member of the New York Chapter, assisted in the presentation by members of the chapter. Mr. A. Garman Dingwall was an able and witty master of ceremonies, and the entertainment and speakers were deftly inserted between courses. It is not possible to report to you all the fun we had. We can only wish that each and every one will have an opportunity to attend a banquet and join in the relaxation and the opportunity to enjoy the companionship of our fellow members and guests.

The final session, a round table on "Muscle Studies," Miss Signe Brunnstrom presiding, was outstanding. The careful work and research and method of presentation made everyone wish that more time could have been allotted, and it is hoped that the discussion will continue another year.

We feel that we cannot adequately describe all the events of the convention. We are indebted to the New York Chapter and to Mrs. Lois Young, national program chairman, for their efforts in preparing such an outstanding program. Throughout the coming year papers presented at this convention will appear in the REVIEW.

Next year the convention will be in San Francisco. Let's have every chapter represented.

American Red Cross

It is urged that every eligible member respond to the Red Cross Roll Call. Doctor De Kleine of the Red Cross kindly consented to come to the Nineteenth Annual Convention to explain the aims of this roll call. It is an enrollment only and has nothing to do with service in the Red Cross but is a list of individuals who have expressed their willingness to serve in the Army or Navy in time of national emergency. The Army is enrolling women only; the Navy is enrolling men only. The question of military status was discussed and it is hoped that in the Fall we will be able to secure the passage of a bill to give physical therapy technicians the same rating as Army nurses. Enrollment, however, should be now in order that the Red Cross may know how many individuals are available, if and when needed. The Nineteenth Annual Convention resolved that the members of the American Physiotherapy Association be urged to join the Red Cross Roll Call. Enroll now!

Address of the President

It has been customary at this time for the president to give expression to rather idealistic thoughts which are intended to leave with the membership a burning inspiration and desire to strive for higher professional achievement. I feel quite unequal to such a task, however, and intend, therefore, to be intensely practical and speak to you in terms of what has been done and what remains to be accomplished in order to achieve the goal set for the Association by the present Executive Committee.

After taking office and surveying the many tasks confronting it, the Executive Committee selected two which it believed to be most vital to the welfare and future of our Association and determined to concentrate its main energies on the development of these two major problems. The first and greatest need, we believed, was to increase the usefulness of the Association to its members and to make each member feel an integral part of the organization. The second was to broaden the scope of our Association in the professional field.

To accomplish the latter a Committee on Relations was established. This committee, although created only last year, has already developed new contacts and fostered improved relations with other professional groups. The attractive booklet compiled by Miss Furscott, the chairman of this committee, has been a great aid in explaining the policies and aims of the Association to our professional as well as lay associates.

Our greatest energies, however, were of necessity devoted to the development of the first of our self-appointed tasks, namely, to increase the usefulness of the Association to its members and to bring home to our members the importance of participation in chapter affairs. In order to do this it was necessary to convince a large number of our members of the advisability of chapter affiliation. It was essential that this group be made to understand the advantages as well as the necessity for such relationship. Believing as we do that the strength and influence of the national association is dependent upon the virility and quality of its state chapters, we urged our members to form such organizations in states where our Association had sufficient representation. Emphasis was placed on state meetings of high caliber in order to attract dilatory and indifferent members-at-large. Our legislative chairman has worked unceasingly to awaken chapters to their responsibility and to arouse our members to the importance and benefits to be derived from chapter affiliation. Miss Leverone, we believe, has reason to point with pride to her record of nine new chapters and three others pending, an increase of almost 50 per cent in our total number of chapters. As a result, our membership (which, by the way, has shown a greater increase the past two years than for any similar period in the history of the Association) has been redistributed so that instead of half the members being unaffiliated with chapters, only one-third is now without such affiliation.

While some of our members-at-large are too remote to benefit directly from chapter membership, a large, as a matter of fact, a much too large proportion of our membership remains aloof for reasons of indifference or economy. These views are ill-considered and short-sighted from both the personal as well as professional standpoint. A chapter's prestige and influence mounts in direct ratio to the size of its membership and the interest displayed by that membership in professional activities. Without enumerating them it should not be hard to see that definite advantages accrue from active participation in chapter affairs. When considered carefully it is doubtful if sincere interest in one's professional growth can be reconciled with membership-at-large, except, of course, in cases where distances are too great to make chapter membership feasible.

To increase further the cooperation between chapters and the national association, the Executive Committee this year initiated the custom of direct contacts through the visit of a director or officer to the chapter. Nineteen such visits were made and it is believed much was accomplished in the mutual understanding of chapter and national problems. The resulting good will has done much to increase the unity within the organization. This spirit of unity, understanding and service, we believe, must prevail if our Association is to grow and fulfil its purpose and obligation to its members as well as the profession. Such a spirit, however, cannot grow and permeate the organization through the efforts of the officers and directors alone. There must be mutual response and responsibility. Each must do his share. One-third of our membership cannot be allowed to remain inactive but must share in this effort to give service

and to gain unity and understanding. Executive officers may point the way, chapters may provide the medium, but in the last analysis it is upon individual effort in a united enterprise that the future of our Association rests.

There have been other gains these past two years for which our chairmen and officers deserve much credit. These will be presented to you in the following reports of the Executive and standing committees. So that you may more readily understand the work that has been carried on in the offices of the national association during the last two years, there has been arranged a display in the exhibits room which will graphically present these activities to you.

Before concluding I should like to take this opportunity to express to our hard-working chairmen my appreciation of their efforts; to the members of the Executive Committee who have shown such fine cooperation, my gratitude for their never-failing interest and support, and to fellow members, my thanks for the opportunity to have served as their guiding officer. It has, indeed, been a privilege and a pleasure.

HELEN L. KAISER.

Report of the Executive Committee

Two official meetings of the Executive Committee were held this year. The first was in Cleveland, January 13th and 14th with Miss Kaiser, Mrs. Cleaveland, Mrs. Young, Mrs. Deatherage, Mrs. Landis and Miss Beard present. The second meeting was held in New York City, June 23rd. Those present were Miss Kaiser, Mrs. Cleaveland, Mrs. Young, Mrs. Deatherage, Mrs. Landis, Miss Greene, Miss Beard, Miss Irvine and Miss Worthingham.

The officers held fifteen additional meetings during the year on the following dates: August 16, September 13, October 4 and 25, November 14 and 29, December 13, 1939, February 2 and 16, March 6 and 22, April 12, May 2 and 17, and June 3, 1940, making a total of 17 meeting for the year.

RECOMMENDATIONS FROM 1939 CONVENTION

The question of inactive membership was brought up at the Denver meeting last June and was returned to the committee for further study. A new plan for inactive membership will be presented at this session.

The newly formed Relations Committee which was appointed last year has proved itself a valuable addition to the Association. Under the direction of Miss Hazel Furscott, chairman, a package of physical therapy literature has been assembled and distributed to organizations interested in our Association. The American Physiotherapy Association booklet giving the purpose of the Association is another important piece of work carried out by this committee and has received very favorable comment from members of the medical profession.

The waiver clause of the Registry was reopened at the request of our Association, and 102 members of 214 eligible for the waiver took advantage of this privilege.

The Executive Committee voted to grant junior members of the Association the privilege of wearing our insignia. Prior to this time only senior members might wear the pin and emblem. Recent graduates have been urged to purchase arm bands or pins upon graduation from their various schools.

The 1940 directory was published in May and contains the names of 1,077 members. Breaking down this figure, we find our members engaged in the following types of physical therapy work:

Hospitals	440
Schools	154
Physicians' Offices	94
Private Practice	87
Crippled Children	79
Visiting Nurse Associations and Public Health	66
Clinics	53
Veterans Facility	22
Industrial Organizations	9
No position designated	73

The policy of sending out membership and chapter letters has been continued this year. All members of the Association received four letters and the chapter officers were sent two letters pertaining to chapter business.

The increased membership and the office work entailed in handling the membership records and dues has made it necessary to have a part-time typist to assist the business secretary. With the aid of an additional person we have endeavored to take care of all correspondence promptly and conduct the national office in a more businesslike manner.

The war has curtailed much of our correspondence with foreign countries. However, we have been in touch with Doctor Galbraith of Australia regarding exchange positions in his hospital.

Mrs. Cleaveland represented the American

Physiotherapy Association at the Canadian Physiotherapy Association meeting in January, and we are happy to have Miss Shilton, of the Canadian Association, with us at our convention. In comparing the two organizations, we find that we have many problems in common and we feel sure that personal contacts of this sort will be of mutual benefit.

Convention programs were again mailed out to some 400 physicians, including all members of the Congress of Physical Therapy. We hope we may have the pleasure of welcoming many of these physicians to our meetings this week.

Despite the fact that the bill for military status has been given an unfavorable report from the War Department, the Association is continuing its efforts to establish such a status. In the interest of this bill Miss Kaiser and the president of the American Dietetics Association spent two days in Washington attempting to locate the opposition and to overcome it if possible. In the course of their visits to members of the General Staff and the Secretary of War, it was continually brought out that approval of the War Department must come first before favorable consideration will be given it in Congress. We have been fortunate in enlisting the support of the American College of Surgeons in this matter and, in cooperation with the American Registry of Physical Therapy Technicians and other medical groups, we hope to obtain a favorable report when the bill is next presented.

In the meantime the Association has assisted the Red Cross in their enrollment plans by individual letters to all members endorsing the Red Cross plan and urging all eligible to enroll at once. As a result of the conferences in Washington we were given to understand that enrollment in the Red Cross would not retard the passage of the bill but would further our cause by showing that we are interested and willing to cooperate in an emergency.

As the Association has grown, the number of chapters has increased to such an extent that the reading of individual chapter reports at the annual convention has not seemed feasible. The reports have been compiled and will be mimeographed and a copy mailed to each chapter so that the chapter may compare programs and other activities carried on by our groups throughout the country.

In the meantime you may be interested to know that the number of meetings per year varies from one to twelve, or an average of six meetings per chapter.

Our total Association membership has increased tremendously and is reflected in the chapter enrollment. In comparing nineteen chapters with last year's report we find fourteen chapters have increased their membership, three decreased and two have remained the same.

The subjects for lectures have great variety, but the greatest interest still centers around orthopedic problems, poliomyelitis, cerebral palsy and posture. There were several chapters which had lectures on circulatory disturbances and other groups which were addressed on neurological subjects. Some chapters were fortunate enough to have members speak on physical therapy in foreign countries.

The scope of our work is broadened by a better understanding of the problems and work of allied professions. Many chapters have had speakers from the field of occupational therapy, social service, and vocational rehabilitation. They are to be commended for their interest in other medical groups.

Through the efforts of the Legislative Committee, which also has sponsored chapter growth, more chapters have arranged meetings with their state hospital associations. Those chapters taking part in state hospital programs this past year are Texas, California, Pennsylvania, Wisconsin, Illinois and Michigan (the last three, in a tri-state meeting in Chicago). Excellent programs were arranged and relationships established which were most beneficial to our Association.

As the number of chapters in the American Physiotherapy Association grows, there is a greater opportunity for neighboring chapters to have joint meetings. The Maryland and District of Columbia chapters met together this year; also Southern California and Santa Barbara, and the above-mentioned tri-state group in Chicago. Sectional meetings of this sort do much to bind the individual chapters together and it is hoped that we may hear of more groups following this plan.

REPORT OF THE VOCATIONAL SERVICE

Total applicants	57
Total openings	45
Number of applicants placed	18
Number securing positions from some other source	11
Number dropped by request	12
Vacancies at present	15

Many of the applicants carried on the files specify definite locations or type of work. These positions are not always easy to find and for that reason the turnover is not as great as it might be. If the eighteen members placed were to pay commercial rates for vocational service rendered them as members of the American Physiotherapy Association, the amount would total $1,180.

Respectfully submitted,
ELOISE T. LANDIS, Secretary.

Report of the Treasurer

June 8, 1940

American Physiotherapy Association,
Akron, Ohio.

Ladies:

We have made an examination of the cash transactions of the American Physiotherapy Association as recorded on the Treasurer's books for the fiscal year ended April 30, 1940. As a result of this examination, we present the attached statement of cash receipts and disbursements.

The cash balances shown at the close of the period were reconciled with deposit balances shown on confirmations obtained direct from the respective banks. All recorded receipts were traced to bank deposits, and all disbursements were found to be supported properly by cancelled checks and vouchers. The balance of cash in the office fund and in The PHYSIOTHERAPY REVIEW office fund amounting to $26.05 was not counted by us.

The fidelity bond of Mary L. Deatherage in the amount of $8,000 was examined and found to be in order.

If additional information is desired in connection with this report, we will be glad to supply it on request.

Yours very truly,
Chandler, Murray & Chilton.

AMERICAN PHYSIOTHERAPY ASSOCIATION
Statement of Cash Receipts and Disbursements
Fiscal Year Ended April 30, 1940

CASH BALANCES, APRIL 30, 1939:		
Cleveland Trust Company, Cleveland, Ohio	$ 3,268.31	
National City Bank, Cleveland, Ohio	2,000.00	
Central National Bank, Cleveland, Ohio	2,082.71	
First-Central Trust Company, Akron	2,078.61	
Dime Savings Bank, Akron	2,075.16	
	$11,504.79	
Cash—office fund	2.87	
		$11,507.66
RECEIPTS:		
Membership dues:		
Senior	$7,641.00	
Junior	312.00	
Associate	72.00	
Prior or prepaid	290.50	
	$ 8,315.50	
Physiotherapy Review:		
Subscriptions	$ 868.48	
Illustrations and reprints	267.02	
Advertising	644.78	
Sale of single copies	38.05	
Dr. Coulter's book	9.00	
	$ 1,827.33	
Convention:		
Registration fees, etc.	120.00	
Exhibit space rental and miscellaneous	566.11	
	$ 686.11	
Application fees	402.00	
Examination fees	630.00	
Sale of pins and emblems	223.00	
Interest received	129.36	
Miscellaneous	28.22	
		$12,241.52
		$23,749.18
DISBURSEMENTS:		
Business secretary's salary	$ 1,500.00	
Less: Social Security deduction	15.00	
		$ 1,485.00
Convention expense:		
Speakers and events	$ 798.75	
Exhibit expense	50.00	
Programs	54.13	
Travel	985.52	
Miscellaneous	865.05	
		$ 2,753.45
Physiotherapy Review:		
Stenographer's salary	$1,500.00	
Less: Social Security deduction	15.00	
	$ 1,485.00	
Office supplies	230.61	
Printing and postage	2,394.75	
Reprints and halftones	346.25	
Rent	372.00	
Dr. Coulter's book	6.84	
Miscellaneous	126.12	
		4,961.57
National Office Expense:		
Pins and emblems	131.00	
Printing and stationery	404.86	
Postage and express	87.44	
Stenographic service, telephone and miscellaneous	344.04	
Professional services	48.00	
Office rent	240.00	
Fidelity bond	20.00	

Social Security taxes.....	63.70	
Refunds	47.61	
Exchange charges	2.83	
		$ 1,389.48
Executive Committee expense:		
Education .....$	55.40	
Office expense, supplies, postage	158.11	
Publicity and A.P.A. exhibits	132.27	
Miscellaneous—directories, etc.	548.17	
		893.95
		$11,483.45
CASH BALANCES, APRL 30, 1940:		
Cash on deposit:		
Cleveland Trust Company, Cleveland .....$	3,873.84	
National City Bank, Cleveland	2,024.44	
Central National Bank, Cleveland	2,108.18	
First-Central Trust Company, Akron	2,118.37	
Dime Savings Bank, Akron	2,114.85	
Cash—Office fund	26.05	
		12,265.73
		$23,749.18

Respectfully submitted,
MARY L. DEATHERAGE, Treasurer.

Report of the Committee on Education

The Committee on Education sends in the following report ending as of May 1, 1940. Your chairman on this committee came into office in November 1939, replacing Miss Florence Phenix. The other members of this committee are: Mrs. Margaret Cleaveland, National Vice-President (in charge of membership), and the new appointment of Miss Janet B. Merrill of Boston. During this time the usual inquiries have been answered pertaining to standards, courses, examination, apparatus and schools. There were 65 applicants for examination for membership into our Association; 24 failed to pass; of this number those receiving not less than a score of 50 per cent are to be allowed to retake the examination. The program of education of the various chapters is impressive in that many valuable lectures and classes have been arranged for the members. The individual chapters have reported from time to time in the REVIEW the program activities which they have sponsored. It is encouraging to see the change in procedure. Instead of the usual business meeting and lectures, schedules have been made for one- and two-day assemblies. Some were held in conjunction with the regional hospital association meetings. This was so with Pennsylvania Physiotherapy Association, Texas and Southern California Chapters. Ohio Chapter had a two-day program for the Annual Spring Meeting. Chicago, Michigan, West Michigan and Wisconsin Chapters participated in the Annual Tri-State Hospital Assembly.

All these are excellent examples of the individual chapter striving to bring new techniques, methods and further study to its members. In Minnesota we find the "Program of Continuation Course in Physical Therapy Technology" available to our members.

Your chairman has attended one meeting of the National Organization for Public Health Nurses held in New York in February of this year. The Committee on Education extends sincere thanks to all the members who assisted in giving the examinations.

Respectfully submitted,
A. DOROTHY FREDRICKSON.
Chairman.

Report of the Legislative Committee

Legislative activities during the past year have been fairly numerous and varied.

We entered the Fall season with follow-up letters to the Medical Examining and Licensing Boards of the fourteen states from whom we had no response to our original 1938-39 questionnaire. Of these, twelve finally conformed. At present, with the exception of Oregon and North Dakota, we have on file for reference purposes a quite complete picture of the status of legislation pertaining to the practice of physical therapy in the various states and territories.

Our first new project included a brief questionnaire to the members-at-large, the purpose of which was to determine if possible how we might best serve these valuable members. Sixty-one, or approximately twenty-five per cent of these, representing twenty-five states and one territory, cooperated in providing us with the desired information. Most of these members expressed a wish for affiliation with a chapter group. They appreciate the value of contact with other members, the meetings at which individual as well as local and national problems may be freely discussed and better understood. They are interested and

enthusiastic for greater knowledge of subjects pertaining to their profession and that of allied groups.

To the members-at-large in states having no chapters, where we have a sufficient and not too widely scattered membership, we urged chapter organization. In states where chapters have been organized and where there are sufficient members-at-large in any one section, we advised organization of districts of the state chapter. To isolated members-at-large, we recommended:

1. Correspondence contacts with other isolated members in the same or neighboring states.

2. Correspondence contacts with the secretary of the state chapter or other state chapters where the program includes the type of work of particular interest to the member-at-large.

3. Correspondence contacts with the National Secretary or Chairman of Education for information relative to courses of advanced study to suit the needs of the individual member.

4. In those states where the distances between several members-at-large are very extensive, we suggested an annual "get-together" luncheon or dinner meeting for the exchange of ideas and discussion in general.

In order to provide more completely for these members, letters were sent to eighteen chapters requesting that they increase their membership from among the members-at-large in their respective states. Six chapters rendered definite account of their activity in this matter.

Central New York—Miss Estelle J. Dean reported: The five members on her list applied for membership in either the Central, Western or New York City Chapter.

Massachusetts—Miss Lella Dwyer reported: Three of the six members on her list expressed desire for chapter membership.

New York City—Miss Marion Farrell reported: Mrs. Winstanley contacted every member-at-large on the list, with a fairly good response.

Wisconsin—Miss Gertrude Bartlett reported on three members. One was accepted for chapter membership and one wished to do so but was uncertain as to where she would be located.

Colorado has not only taken care of its members-at-large, but also two from neighboring states.

We would welcome more of these reports.

As you know, the duties of the Legislative Committee were augmented last year to include the "growth and organization of chapters," and we have exerted our greatest effort in this direction. We are pleased to report that the Oregon Chapter has been reorganized and that new chapters have been formed in Maine, Virginia, Maryland, Connecticut, North Carolina, Georgia, Eastern New York and Indiana. Our members in Louisiana held a preorganization meeting at which officers were elected and plans prepared for early Fall organization. Our Missouri members are awaiting final instructions regarding the drafting of a constitution before submitting it for approval. They, too, have elected temporary officers. Our Iowa members have taken first steps toward organization of a state chapter. Dr. Krusen of the Mayo Clinic is sponsoring the organization of a district of the Minnesota Chapter by eligible physical therapists in Rochester.

While giving considerable thought and attention to the requirements of members-at-large and new chapter groups, we realized a need for similar attention to the requirements of our long established chapter groups. In order to promote a more thorough knowledge of these we instituted "personal contact visits" to the chapters by officers and directors of the national Association. The visits were planned to provide a setting for open discussion of local and national problems, aims, etc., and their relations to each other, and to offer chapter members an opportunity to express their uncertainties regarding national policy and administration or any other matters of importance to them.

We "visited" as many chapters as possible. Miss Beard went to Minnesota; Mrs. Cleaveland to Central and Western New York; Mrs. Deatherage to District of Columbia and Maryland; Miss Greene to New York City and Philadelphia District of the Pennsylvania Chapter; Miss Kaiser to the Pittsburgh District of the Pennsylvania Chapter; Miss Irvine to Oregon and Washington; Mrs. Landis to Georgia, Carolina and Virginia; Miss Leverone to Maine; Mrs. Young to Michigan and Western Michigan; Miss Worthingham to Colorado and Illinois. Miss Worthingham will visit the California chapters in the Fall.

From these contacts we have gathered much vital information upon which to formulate a constructive policy. Most of the present problems which confront our chapter members are of such a nature that they may be quite readily solved by the intelligent enthusiasm and inherent initiative of these members.

Two issues, however, demand serious thought and well-ordered action. They con-

cern training and licensure for the practice of physical therapy. We have learned with regret that several short term courses have been sponsored by licensed physicians of high repute. Apparently these physicians fail to realize that by giving sanction to these courses they are favoring lower standards for the members of our profession. It should be our right to call their attention to this matter. We may expect their cooperation when they have been made fully cognizant of the situation.

In the matter of licensure we have also met men of authority who fail to see the necessity for higher standards of training as requirements for licensure of physical therapists. In the light of present day education it is difficult to find logic or reason in their attitude.

To offset these disturbing elements are many encouraging factors. Several groups have made definite contacts with legislators and members of the medical societies in their states in an effort to prevent the proposal or enactment of vicious legislation pertaining to the practice of physical therapy. One state medical group asked our cooperation in the preparation of legislation regulating the practice of physical therapy in that state. One chapter cooperated with the state university in setting up a physical therapy section in the continuation course offered by the university. Many chapters have planned meetings with members of allied groups.

Most enlightening are the suggestions from the various chapters, particularly in regard to advanced study. One which concerns us at this time is to the effect that we include a short brush-up course in the convention program; two hours each day to be set aside for the course, while the balance of time would be left open for the usual convention program.

Another recommended that we include work toward an academic degree by planning convention for a few years in regions offering opportunities for advanced academic work. A four weeks' course was suggested, the first week to include those registered for convention and the following three weeks those registered for credit.

A third suggestion for advanced study concerns a national program of study groups within the chapters. A chapter might in its study group undertake the same subject to be covered by a brush-up course at convention. Members attending the convention course would be better prepared for discussion.

There is also interest in a program which will permit exchange of ideas and opportunity to know more about the experiences of our members.

One chapter advised the standardization of courses in various schools of physical therapy in order to evaluate physical therapy training toward advanced degrees.

We have recommended: Full chapter programs; business meetings to be conducted according to rule; papers by members as well as by representatives of the medical profession and other allied groups; individual research to consist of a selection of "unusual" cases, followed by a summary of all available literature concerning each type of case. In this manner knowledge of several subjects might be well advanced during the year. We have advised contacts with local and state medical groups, occupational therapy groups and nursing organizations. We suggested that membership chairmen promote "Physical Therapy as a Vocation" among high and preparatory school students, parent-teachers' associations, directors of vocational guidance, and all other groups and individuals concerned with young women preparing for a profession.

In order better to correlate the activities of the chapter and national association, it is pertinent that the chapter constitutions should more thoroughly conform to the revised national constitution. A Constitution's Committee of four members—Miss Lucy Marshall, Miss Edith Monro, Miss Doris Volland and Mrs. Winifred Willard—was appointed, and copies of our model chapter constitution and revised national constitution were sent to the chapters with a request that they study these with the idea of revising their constitution wherever necessary. To date, eight chapters have complied and several more soon will be ready.

We have received the following reports from legislative chairmen of the chapters:

Chicago—Mrs. Bess Searls reports: "No matters of importance have been reported to us by Dr. Neal of the American Medical Association Legislative Committee. The chapter was encouraged to write Washington urging consideration of a bill to recognize Army Aides. The chapter constitution was studied with the idea of revising it to conform with the model sent by national. This involved a change of name from 'Chicago Chapter' to 'Illinois Chapter.' The revised constitution was presented to the membership and it was voted to accept the change in name. We are

now the 'Illinois Chapter' of the American Physiotherapy Association."

Colorado—Miss Marguerite Collins reports: "There has been no new legislation concerning physical therapy during the past year. Letters were sent to Senators and Representatives of Colorado in Washington, asking for their support of bills S. No. 3318 and H.R. 8542. A chapter letter was sent to Senator Edwin C. Johnson stating that we wished to go on record as approving the adoption of Senate bill No. 3318. He answered promptly stating he would watch this legislation carefully and keep us posted on its progress. The bill has been placed in the hands of a subcommittee with Senator Josh Lee as Chairman."

Maine—Miss Florence Orr reports: "To date Maine has no legislation concerning the practice of physical therapy. Our national chairman suggests that for the present we should concentrate our efforts toward making our state medical societies aware of our work and the standards we have set for this work; and at the same time, through our local state legislators, keep a 'weather eye' on any proposed legislation pertaining to physical therapy."

Maryland—Miss Edna M. Blumenthal reports: "At the February meeting of the Maryland Chapter, Dr. Sprunt represented the Committee of the Council of the Medical Chirurgical Faculty of Maryland to discuss the possibility of regulation of physical therapy in the State of Maryland. The matter was referred to the Committee on Legislation. Two meetings were held to discuss registration versus legislation for physical therapists in Maryland. A report was drawn up and presented at a joint meeting of the Committee of the Council of the Medical Chirurgical Faculty of Maryland and the Maryland Chapter of the American Physiotherapy Association. The report, favorably received by the committee, was referred to the Council."

Report received from Dr. Sprunt: "1. The Medical and Chirurgical Faculty appreciate the educational background, the skill and the ethical ideals of the physical therapists. 2. The Medical and Chirurgical Faculty acquiesce in the formation of a registry of physical therapists to be organized, controlled and financed entirely by the physical therapists themselves. 3. That the Medical and Chirurgical Faculty appoint a small committee from their membership to advise with the physical therapists on matters of common interest."

Massachusetts—Miss Lucy Marshall reports: "A letter from the Chairman of Legislation of the American Physiotherapy Association requested that we examine and if necessary revise our constitution in order that it conform with the national constitution. A model constitution was sent to us. A careful study has been made, and with the approval of the Executive Committee of the Massachusetts Chapter, we report as follows: Our constitution revised in 1935 and approved by the Executive Committee of the American Physiotherapy Association, in spirit conforms and interpretation closely follows the model. It is suggested that a chairman be appointed to a Committee on Relations whose duties will conform with those of the National Chairman, Committee on Relations, as adopted at the convention last June. As no group in this state has expressed sufficient desire to form a district, it seems unnecessary at this time to add an Article on Districts. There have been no activities in the legislative body of the Commonwealth of Massachusetts relative to or affecting the practice of physical therapy."

Ohio—Miss Helen M. Vogan reports: "We have had no report of legislation proposed in the State of Ohio relative to the practice of physical therapy."

Pennsylvania—Mr. Samuel M. Henshaw reports: "A communication was addressed to the State Board of Medical Education and Licensure regarding a man who is practicing illegally. The chairman of this committee was asked to testify as an expert witness in the case of the United States Government versus a citizen who has been accused of using the United States mails to promote a health building scheme which is claimed to be fraudulent. The hearing was postponed indefinitely. The American Red Cross has asked to notify all our members of the wish of the United States Surgeon General that all qualified physical therapists enroll with the United States Army or Navy Reserves."

Santa Barbara—Miss Mabel Ward reports: "Our California Chapters have been very active during the past two years in an effort to combat vicious legislation. In 1939 we succeeded in having one bill 'tabled.' In May 1939, an amended but still vicious bill was presented. Each member of the Santa Barbara Chapter wrote Assemblyman Robertson asking him to vote against this bill. A letter was received from the National Legislative Chairman advising us to contact a member of the State Assembly in order to be informed of any new or pending legislation. Each member also wrote the California Senators and Representatives in Washington asking their support of Senate Bill No. 1615 and House Bill 4934. Dr. R. F. Atsatt as a member of the Santa Barbara Clinic and the Santa Barbara Cottage Hospital Staff sent similar letters to these Senators and Representatives. On April 5th a copy of our newly adopted constitution and by-laws was sent to Miss Lucy Marshall, as requested by the National Legislative Chairman."

Wisconsin—Miss Alfaretta Wright reports: "The law regarding the practice of physical therapy in Wisconsin has not progressed beyond the proposed stage. No new legislation has been proposed or passed this year. The committee has been in touch with the Legislative Committee of our national association in regard to proposals made by the Wisconsin Physical Therapists' Association.

Nothing further was done about the proposals."

In closing, I wish to express sincere appreciation for the splendid cooperation manifested by all members-at-large and chapter groups. It is this fine spirit which has made it possible for us to report favorably on our activities.

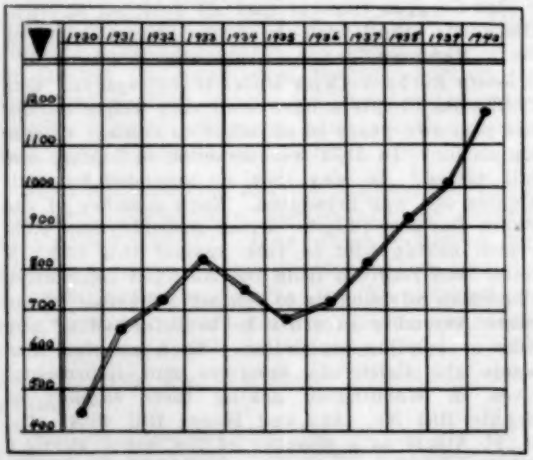
We are approaching a time when the representative chapter groups in all sections of the country will enable us to advance a more extensive program, to include state, interstate and sectional meetings. With these to supplement our annual convention we may look forward to a bright, clear future for the practice of physical therapy.

Respectfully submitted,
CECELIA A. LEVERONE, Chairman.

Report of the Membership Committee

In order that you may visualize the gains of the past year I have prepared a graph with figures for 1939 and 1940,

MEMBERSHIP GRAPH



From May 1, 1939, to May 1, 1940, we received 184 applications. One hundred forty-five of these were accepted; 54 individuals became members by examination and there were 11 reinstatements, making a total of 210 new members.

Nine members were dropped and 22 resigned. This is interesting, because the Executive Committee has been advising members to resign in good standing rather than to be dropped for nonpayment of dues, and resignations have risen from 15 in 1939 to 22 in 1940, while the number dropped has decreased from 19 to 9.

We have lost 4 members by death—Eleanor Lynn and Eleanor Kite of Pennsylvania, Lucy Cooper of Chicago, and Clara Truesdell of Central New York.

Twenty-five applicants were rejected and 35 failed to pass the examination.

Forty-six juniors applied for active membership and were accepted.

There were on May 1, 1940, 1017 active, 143 junior, 25 associate and 9 honorary members, making a total membership of 1194.

Of the 1160 junior and active members, 862 belong to chapters and 298 are members-at-large. Comparing this with the figures for 1939 (692 chapter members, 300 members-at-large), chapter membership has risen from approximately twice to three times the membership-at-large.

TABLE 1

May 1, 1939	Types of Membership	May 1, 1940
904	Senior	1,017
88	Junior	143
23	Associate	25
9	Honorary	9
1,024	TOTAL	1,194
692	Chapter Members	862
300	Members at Large	297

The recommendation made in 1938, namely, that all applications be made in duplicate, and the recommendation made at last year's convention in regard to transfer of members from one chapter to another, have both been put into effect the past year, with greatly increased efficiency in both chapter and national offices.

The Executive Committee has enlisted the cooperation of chapters in states or cities where there are approved schools to use their influence to interest the students of these schools in the American Physiotherapy Association. The response has been most gratifying. Last year 86 graduates of 13 approved schools applied for and were accepted for membership. The membership chairman ascertains the number of students in the graduating class of each school, and several weeks before the date of graduation application blanks are sent. These are returned with credentials and fees in time to be voted on so that the graduates may be given their junior membership cards at graduation. One school gives an emblem to each graduate. This spring several schools have sent in ap-

plication blanks for their entire graduating class.

The past two years have been most interesting ones. I feel so much closer to you all, and, as I relinquish my duties, I wish to thank the officers of the chapters for their cooperation which has made the wheels move more rapidly and smoothly. Especial thanks and appreciation are extended to the many members who conducted the examinations, giving their valuable time and earnest, conscientious thought to this task.

To my successor, I can say you have an interesting and inspiring two years ahead of you.

Respectfully submitted,
MARGARET W. CLEAVELAND,
Chairman.

Report of the Publicity Committee

At our last annual convention the Executive Committee appointed Miss Irene Mezek as Chairman of Exhibits. Having a subcommittee for this part of the work lightened the duties of this office considerably. Her report is attached, and it shows that a great deal of time has been spent on our exhibit material.

A questionnaire was sent out in December to all the chapters in order to make a survey of the kind of publicity carried on by each chapter. Fifteen replies gave the following:

1. REVIEW subscriptions:
   One chapter sent to one library.
   One chapter sent to two libraries.
   One chapter sent to four libraries.
2. Notices of meetings in local newspapers —Seven chapters send notices regularly.
3. Notices of meetings in professional journals—One chapter sends notices.
4. Physical Therapy Emblems—One chapter has voted to have all members wear them.
5. Membership in National Hospital Association—One chapter belongs.
6. Affiliation with County Medical Associations—One chapter exhibits in two counties.
7. Affiliation with State Medical Association—Four chapters have meetings with their State Medical Association.

The following chapters have sent in their reports of the publicity programs for the year: Minnesota, Pennsylvania, Wisconsin, Ohio, Colorado and Santa Barbara.

Notices and programs of our convention have been sent to:

Six schools of occupational therapy and the "Occupational Therapy" magazine, 46 schools of physical education, "American Journal of Nursing," Miss Beeby, Editor; American Congress of Physical Therapy, Miss Marion Smith, Registrar; American Medical Association; "The Crippled Child," Miss Hackett, Editor, and 16 schools of physical therapy.

Total expenses for this year were $20.49.

Respectfully submitted,
HELEN S. FOSS, Chairman.

Report of the Exhibit Committee

The old exhibits on hand have been renovated. Replacements and repairs have been made. To date we have on hand the following exhibits in good condition:

"Reproduction on History of Physical Therapy."
"Treatment of Spastic Paralysis."
"Miniature Physical Therapy Department."
Film on "Technique of Massage."
New exhibit on "Posture."

The Exhibit Committee has worked in conjunction with the Tri-State Hospital Exhibit Committee (Illinois, Michigan and Wisconsin Chapters) in the creation of a new exhibit on "Posture." This exhibit was shown at the Tri-State Hospital Assembly in Chicago in May 1940. It now is the property of the American Physiotherapy Association. The National Exhibit Committee sent this exhibit to the Illinois State Medical Society Convention in Peoria in May.

Pictures of the exhibits on hand are in the process of being made and we hope will be ready soon.

A card file has been made of each exhibit giving a description of exhibit, display record, cost of shipping and will include a picture.

The Committee has sent out one flyer in a chapter letter and two notices in the REVIEW about prizes offered for exhibits. We have sent out over a hundred applications for scientific exhibits for convention to chapters, members, schools of physical therapy and physical education. Some very interesting replies and inquiries have been received although the applications go directly to New York.

The following exhibits have been sent out this year:

"Treatment of Spastic Paralysis"

Sept. 1939—American Congress of Physical Therapy Meeting, New York.

Mrs. Irene Ashbee, a member of the New York

Chapter assumed the responsibility for this exhibit.

Oct. 1939—National Society for Crippled Children, Dallas, Texas.

April 1940—Academy of Physical Medicine, Richmond, Va. The Virginia Chapter was responsible for this exhibit. Dr. Barger was very pleased with the cooperation of Miss Alice Jones, President, and the chapter.

April 1940—Cook County Hospital Alumnae Meeting, Chicago.

May 1940—American Physiotherapy Association Meeting, Ohio Chapter, Cleveland, Ohio.

"Miniature Physical Therapy Department"

April 1940—Cook County Hospital Alumnae Meeting, Chicago.

Film on "Technique of Massage

May 1940—Washington Physiotherapy Association, Washington, D. C.

"Reproductions on History of Physical Therapy"

April 1940—Cook County Hospital Alumnae Meeting, Chicago.

New Exhibit on "Posture"

May 1940—Illinois Medical Society, Peoria, Ill.

There has been a suggestion that we exhibit at the Indiana Medical Society Meeting in October at French Lick Springs. We will leave that up to the new committee, as we will have two new exhibits in June.

We were very sorry that we were not granted exhibit space at the American Medical Association Meeting. All of the organizations making applications are not granted space each year because of the limited number of booths and it seemed to be our turn to be left out.

We have purchased two additional shipping cases for frames and posters, and five new frames so that we may have two exhibits en route at one time.

Total expenses for this year were $39.50.

In spite of the fact that we have purchased two new shipping boxes we do not have adequate storage space for exhibits which are kept in the REVIEW office. We recommend that an appropriation be made for a storage cabinet of some kind so that posters which have cost considerable money and taken considerable time to make and repair do not become soiled standing in the office.

We have only made a start at the organization of this committee but feel that the work is outlined so that a new committee will have a foundation with which to start work.

Respectfully submitted,

IRENE C. MEZEK, Chairman.

Report of "The Physiotherapy Review"

It is interesting to note by comparison the growth of THE PHYSIOTHERAPY REVIEW during the past ten years. In 1930 there were approximately 75 subscriptions outside of the membership list. Today there are over 350 such subscriptions and the magazine is being sent to all parts of the world. This means there has been a 400 per cent increase in subscriptions during the past ten years. Since 1930 there has been a 30 to 40 per cent increase in the contents of each issue of the magazine. This includes original articles, abstracts of current literature and book reviews. In 1930 the book reviews averaged one, two or three in each issue; today our magazine contains from nine to nineteen reviews. This, we feel, is recognition on the part of publishing companies that our publication is a valuable source for acquainting the profession with new books.

During the past year 47 articles have been published, making an average of 8 articles per issue and covering 207 pages, as compared to 1938-39 when we published 54 articles covering 188 pages. A classification of the articles for the past year is as follows:

Articles on	
Arthritis	3
Cerebral Palsy	3
Crippled Children's Programs	4
Dermatology	1
Electrotherapy	1
Fractures	2
Injuries	2
Neurology and Psychiatry	4
Orthopedics	6
Peripheral Vascular Diseases	2
Physical Therapy Technique	11
Physical Therapy as a Vocation	1
Role of Physical Therapy in Hospitals	1
Role of Physical Therapy in Social Security	1
Speech	1
Study of Physical Therapy Costs in Industrial Medicine	1
Miscellaneous	3

It is interesting to note the wide variation in the subject matter of the articles which have been published during the past year. An effort has been made to keep the articles diversified so that each issue would be of interest to all readers, regardless of their branch of physical therapy.

In our "Index to Current Literature" we have listed 433 articles from different publi-

cations. One hundred and six articles were abstracted during the year, and 112 books were reviewed. For the year 1938-39, these figures were as follows: articles listed 405, articles abstracted 84, books reviewed 88.

In accordance with our policy we have again sent one complimentary copy of the REVIEW to each graduating student in the approved schools of physical therapy. We have also continued our publication of the personal news items which are submitted to the REVIEW by our members. A suggestion was made that we have a query and answer column, but that has not materialized since no inquiries have been sent in.

Copies of the REVIEW also have been sent to Miss Hazel Furscott to be distributed by her as part of her work as chairman of the Relations Committee.

The response from the chapters this past year has been very gratifying. All the chapters have notified us of their efforts to obtain articles even though in some cases it has been impossible for them to meet their quota. We are appreciative of their excellent cooperation and also for the suggestions and criticisms that we have received.

Respectfully submitted,
MILDRED ELSON, Editor.

Report of the Business Office

The business office of the REVIEW submits the following statistical report for the period May 1, 1939, to April 30, 1940. (The financial report of the business office is included with the Treasurer's report.)

Subscriptions entered (total)	341
These consisted of—	
Renewals	253
New subscriptions	88
Single copies sold	69
Advertisements run	59
Books sold—"Physical Therapy" by Dr. J. S. Coulter	6
Complimentary copies for the year:	
To exchange journals	246
To advertisers	40
To contributors	51
To book publishers	89
To Advisory Committee and Council on Physical Therapy	150

Total circulation was increased from 1,390 (1938-39) to 1,575 (1939-40) for a gain of approximately 14 per cent.

Respectfully submitted,
HAZEL M. PUTMAN, Business Manager.

Report of the Relations Committee

At the Denver Convention, June 27, 1939, the Relations Committee was created for the purpose of establishing relations between the American Physiotherapy Association and allied organizations for their mutual interests. At that time four definitely established relations existed. The American Physiotherapy Association had a representative serving on the following boards:

Advisory Board of the American Registry of Physical Therapy Technicians—Janet B. Merrill.

Advisory Committee on Services for Crippled Children, U. S. Department of Labor—Mildred Elson.

Advisory Committee of "The Crippled Child" Magazine—Emmy Kylin.

Orthopedic Nursing Council to the National Organization for Public Health Nursing—Florence L. Phenix.

During the past year we have established relations with the American Association for Health, Physical Education and Recreation. Miss Helen Kaiser represents us and Miss Ida Hazenhyer acted for her at the Chicago Convention of the A.A.H.P.E.R. on April 24, 1940, by presenting a paper before the Therapeutic Section, outlining our mutual professional interests.

Mrs. Margaret W. Cleaveland represented the American Physiotherapy Association at the annual convention of the Canadian Physiotherapy Association in Toronto, January 27, 1940.

The reports of Miss Merrill, Miss Elson, Miss Kylin, Miss Hazenhyer, Miss Phenix and Mrs. Cleaveland are appended to this report.

At the annual meeting of the Association of Western Hospitals and the Western Conference, Catholic Hospital Association in Los Angeles, April 8 to 11, 1940, the five Pacific Coast chapters established relations with the Western Hospital Association. The five chapters have 10 members representing them, forming the physical therapy section of the Western Hospital Association. This membership is allotted according to the size of the Chapter: Washington 2, Oregon 1, Northern California 3, Santa Barbara 1, and Southern California 3. The chapter pays the dues of its representatives, who as members of the Western Hospital Association are responsible for the activities of the physical therapy section.

At the annual meeting of the Western Section of the American Congress of Physical Therapy in San Francisco, June 3, 1940, the Northern California chapter presented a poster with informational material and gave out booklets to the members of that organization.

The main activity of the year has been the gathering together of informational literature for distribution to interested organizations and the printing of a booklet explaining our aims and purposes. Dr. Ray Lyman Wilbur, President of Stanford University, has written the foreword to this booklet. The informational material is:

"Physiotherapy as a Vocation"—Ida May Hazenhyer, Reprint. Physiotherapy Review, Vol. 19, Number 3, 1939.

"What Does a Physical Therapy Department Contribute to a Hospital"—Eloise T. Landis, Reprint. Physiotherapy Review, Vol. 18, Number 4, 1938.

"Approved Schools for Physical Therapy Technicians"—Reprint. The Journal of the American Medical Association. Vol. 114, pp. 1262-1263, March 1940.

A sample copy of "The Physiotherapy Review."

A directory.

A copy of the constitution.

A copy of "Code of Ethics and Discipline" of the American Physiotherapy Association. Adopted, Atlantic City, 1935.

The booklet "The American Physiotherapy Association is Organized to Serve."

On September 15, 1939, the Executive Committee of the American Physiotherapy Association sent a letter to 10 organizations announcing the creation of the Relations Committee. All of these 10 organizations either requested informational material or expressed a desire for establishing relations. The booklet and a package of informational material was sent to each of these organizations as well as five others who made requests. These fifteen organizations also received a letter inviting their interest in our organization.

Seven of these organizations sent informational material about their organizations which material is on file. Much of this material is of great value for following up of future relations.

A booklet was sent to Dr. Ray Lyman Wilbur; to the State Department of Education, Albany, N. Y., upon request; a package of informational material to Miss Eva Martin, a member in Reno, Nevada, speaking before the Nevada Nurses Association; a package of informational material to the Pennsylvania Chapter upon request; 5 booklets to the Indiana Chapter upon request; a package of informational material to Miss Merrill, Miss Elson, Miss Kylin, Miss Kaiser, Miss Phenix and Miss Hazenhyer; copies of the booklet to all standing committee chairmen and directors of the American Physiotherapy Association.

Fifty-five booklets were sent out to organizations other than those mentioned above.

A questionnaire was sent to all chapters concerning existing local relations. Answers were received from Colorado, Western New York, Western Michigan, Chicago, Michigan, Northern California, Santa Barbara, New York, Minnesota, Wisconsin, Pennsylvania, Rhode Island, Southern California, and one other chapter which had no name on it. This material has not yet been put to use but will be ready for reference when the Relations Committee is ready to help chapters make local relations. This will be part of next year's program.

The Relations Committee feels that this year, which has been given over largely to gathering material and feeling its way, has had gratifying results in the response from organizations so far contacted. It feels that it is now ready to function adequately with a better understanding of its problems.

Respectfully submitted,
HAZEL E. FURSCOTT, Chairman.

Report of the Representative Serving on the Advisory Board of the American Registry of Physical Therapy Technicians

Your representative attended the combined meeting of the members of the Board of the American Registry of Physical Therapy Technicians with the members of the Advisory Board of the Registry, held during a luncheon at the Hotel Pennsylvania, New York, on September 4, 1939. Dr. Bronson Crothers of Boston, representative of the American Neurological Association was the only member of the Advisory Board present beside your representative.

With reference to the suggestion that a reduction in the annual registration fee for technicians from $2.00 to $1.00 might be made, the points were brought out that there had been heavy initial expense borne by the Congress in originating the Registry and that there was a possibility of additional expense in the event of general military mobilization. Therefore, it would be better to wait another year before considering a change, during

which time a cost analysis could be prepared. It was emphasized that there was no intention of making a profit from the Registry fees.

At that time the Registry Board was unwilling to consider suggestions that members of the American Physiotherapy Association who had not taken advantage of the opportunity to register under the waiver clause expiring January 1, 1939, might either be given another extension of time, or might be allowed to take the regular examination for senior registration.

In October, however, following action by the Advisory Committee of the American Physiotherapy Association, a proposal was submitted to the Advisory Board of the American Registry of Physical Therapy Technicians under which members of the American Physiotherapy Association in good standing as of August 29, 1936, would be allowed to file application for registration without examination until January 1, 1940. Your representative voted in the affirmative on this proposal, which was passed.

It should be mentioned here that in order to avoid the criticism of seeming to wish to lower the standards for admission to the Registry, this Association had requested that examinations for senior registration should be reopened for a six month period in 1940, to two classes of our members who are not graduates of approved schools: first, the August 1936 members who had neglected to take advantage of the waiver clause allowing them to become registered without examination until January 1939, and second, the group of our more recent members who by virtue of their experience, had been eligible for the examination for senior registration until January 1938, when this privilege was withdrawn.

Consequently your representative questioned the proposal referred to the Advisory Board providing only for an extension of time for our August 1936 members to register without examination, and advocated the reopening of senior examinations to both groups. The reply from Miss Marion Smith, Registrar, stated that the Board could not accept for examination people who did not meet the present requirements.

While it was felt that the concession offered would be greatly appreciated by the group affected, it seemed that the examinations would have removed any doubt both as to their eligibility for registration and the admission standards of our own Association.

It seemed to be the general opinion of the meeting that short courses in special subjects should be offered by the approved schools. This would enable experienced technicians whose training was incomplete to make up their difficiencies and would permit public health nurses and others to obtain approved physical therapy training by means of leaves of absences over a period of three or four years, without obliging them to resign their positions.

It was agreed, however, that the approval of any such combination of short courses should be left to the Committee on Medical Education and Hospitals of the American Medical Association and should not be accepted by the Registry before such approval was granted.

The entire meeting was very interesting and indicated harmonious cooperation in solving the problems of those engaged in the profession of physical therapy.

Respectfully submitted,

JANET B. MERRILL.

Report of the Representative on Advisory Committee on Services for Crippled Children

There has been one meeting of the Advisory Committee on Services for Crippled Children during the past year. Dr. Robert Hood reported to the committee on the progress and present status of the Advisory Committee on Services for Crippled Children. He stated that the services for crippled children have developed and increased satisfactorily both as to the number of children under care and to the quality of service. Every state in the Union, which includes Alaska and Hawaii, and excepting Puerto Rico, is participating in the program. Registration in the states is more complete. Services during epidemics have been greatly augmented. Workers from other states have been borrowed to meet the need. In Maryland, a temporary splint service was set up, and this also can be done in other states. Additional funds were appropriated which do not require matching by the states which is a great help in meeting emergency needs. In 1939, $2,000,000 was allotted and $3,000,000 was spent. This did not leave a deficit, as when the plan was first started the amount of money allotted to the states was not used due to the fact that the state plans were not put into immediate operation. In 1940, $3,000,000 was allotted for services for crippled children and the same amount budgeted.

In a study of 34,000 cases 20 per cent were poliomyelitis, 10 per cent cerebral palsies, 2½ per cent birth injuries, 7 per cent club foot, 5 per cent cleft palate, 4 per cent tuberculosis, 6 per cent osteomyelitis, 2½ per cent burns. In 46 states, 335 diagnostic clinics were held. Three hundred sixty-nine (369) itinerant clinics were held. Of the 468 hospitals caring for crippled children, 92 per cent are approved by the American Hospital Association. There are projects for cerebral palsy patients in four states.

There is a great need for more care for the Negro crippled child. Whereas it is true that most children's hospitals in the country do not draw any color line, there are but 10 beds reported for convalescent care of the Negro child. There are 512 foster homes approved for the care of crippled children. Forty-two (42) states have advisory committees on services for crippled children. This is to coordinate the care within the state, particularly as to general health and to promote cooperation between the family physician and the state agencies caring for the crippled children. Since there are some states who do not have facilities for operative care, there are reciprocal agreements in 25 states which permit children to be taken across state lines for surgical and other care.

A form for recording the examination and recommendations of the orthopedist in the diagnostic clinic was submitted and approved by the Committee. This was to standardize throughout the country the examination in order that complete records and recommendations will be kept on file with the state agencies and that a copy of the examination plus a blank muscle chart would accompany the child to a hospital, convalescent hospital or foster home where his treatment was to be carried out. A similar plan for cardiac cases was submitted. A sum of money has been appropriated for the care of the cardiac patient. The work was to be carried out in 3 or 4 states, using the same administrative setup as for other crippled children. This will in no way detract from the work of the orthopedic crippled children, as the money definitely has been appropriated for the use of the cardiac crippled children.

On October 18, 1939, a letter was received from Dr. Hood enclosing a copy of proposed standards for a merit system and asking for comments and suggestions from the Advisory Committee. A conference was held with Dr. J. S. Coulter, also a member of the Advisory Committee on Services for Crippled Children. Under the proposed standards for physical therapy technicians one of the requirements was stated as "Graduation from an approved course in physical therapy." It was felt that the statement "approved course" was not sufficient and that it might be misinterpreted. A letter was written suggesting that the statement should be changed to read "Graduation from a course or school in physical therapy approved by the American Medical Association, or a member of the American Physiotherapy Association, or a registered physical therapy technician of the American Registry of Physical Therapy Technicians." A tentative outline was received later in which the suggestions of Dr. Coulter and myself regarding standards for physical therapy technicians had not been included. We felt that the way in which the standards for employment of technicians under the Social Security Act were stated left a loophole for the employment of inadequately trained technicians. This was brought to the attention of the Executive Committee of the American Physiotherapy Association with the suggestion that the physicians on the Advisory Committee be contacted and an opinion received from them before the meeting of the Advisory Committee was held. The Advisory Committee was of the opinion that there should be some qualifying statement following "approved course." Another conference was held with Dr. Coulter and Miss Gertrude Beard, a director of the American Physiotherapy Association, and a letter was written to Dr. Hood asking for clarification of the disputed points. Dr. Hood replied that the length of course had been omitted entirely through oversight and that the words "of at least nine months" should be added to "Graduation from an approved course in physical therapy." He also stated that "in drafting these recommended qualifications for personnel, we considered carefully whether as a government agency it was desirable for us to depend upon voluntary nongovernmental organizations to be the final authority in establishing lists of educational institutions in the various fields with which we are concerned, and came to the decision that it would not be according to good public policy for the Bureau to do this. However, we were, of course, quite aware of the need for any government agency to give thorough consideration to lists of approved educational institutions established by the recognized national organizations. In formulating the regulation concerning personnel standards, the Secretary took this

attitude of the Children's Bureau into consideration. . . . The Children's Bureau, therefore, is under an obligation to take into consideration standards set by national professional organizations, relating to qualifications of professional personnel and classification of professional schools in setting up any list of approved educational institutions. The list of grade A medical schools or of courses of physical therapy approved by the American Medical Association would, therefore, necessarily be taken into consideration by the Children's Bureau in this connection."

Therefore, at the meeting on March 4, 1940, Dr. Coulter introduced a motion that the Advisory Committee on Services for Crippled Children submit to the Children's Bureau a list of approved schools for physical therapy technicians. Dr. Osgood, chairman of the meeting, then appointed Dr. Coulter to submit this list. We feel that this will adequately safeguard the standards of physical therapy technicians employed in state programs under the Social Security Act.

Respectfully submitted,
MILDRED ELSON.

Report of the Representative on the Advisory Committee of "The Crippled Child" Magazine

The annual meeting of the National Society for Crippled Children was held in Dallas, Texas, October 22-25, 1939. Your representative regrets she was unable to attend.

On November 11, 1939, Miss Vivian M. Hackett, Editor of "The Crippled Child" Magazine met with your representative in Cleveland, Ohio, and in an informal way discussed the objectives of the magazine, "The Crippled Child." The talk centered on physical therapy and its place in the program of rehabilitation of crippled children. As an outcome of this meeting, an article on "Physical Therapy in a County Program for Crippled Children" was suggested and is planned to appear in the near future.

Two other articles are under consideration; one on physical therapy in schools for crippled children, the other on physical therapy in a hospital for crippled children. It is planned that both articles appear in the same issue.

At a recent meeting of the Ohio Chapter in Cleveland, Ohio, a member of the American Physiotherapy Association spoke to your representative of some interesting work for crippled children she was doing in conjunction with the local Red Cross and which she felt may be of interest to "The Crippled Child" magazine. This is encouraging. Physical therapy has an important part in rehabilitation of crippled children and through the pages of the magazine "The Crippled Child" you members of the American Physiotherapy Association have an opportunity to tell interested lay-people of your work.

To be associated with "The Crippled Child" magazine and its editor has been a gainful and interesting experience.

Respectfully submitted,
EMMY KYLIN.

Report of Representative at the Meeting of the American Association for Health, Physical Education and Recreation

The outstanding and gratifying feature in the program of the therapeutic section held on April 24, 1940, was discussions of ways and means of coping with the problem of physical examination and measurement. The entire group seemed conscious of the advisability of putting students through an examination. The discussion was primarily on the subject of who should make the examinations.

One gentleman suggested that physical education teachers might be able to detect even such things as heart and blood pressure irregularities and might then refer such cases to a physician. But others of the group believed that a medical examination, if possible, is to be desired. The question here raised was: how to obtain medical examination. Few public schools have such facilities.

Another question touched upon was the importance of examination for lower grades. Most colleges require medical examinations before permitting students to enter physical education classes, but down in lower grades, where it is even more important, such means seldom are provided.

One speaker talked at some length about physical therapy courses for physical education teachers who work in corrective exercises. Her suggestions for such a program sounded very much like the requirements for schools approved by the American Medical Association. In fact, she mentioned the American Medical Association.

Respectfully submitted,
IDA MAY HAZENHYER.

Report of Representative on the Orthopedic Nursing Council of the National Organization of Public Health Nursing

During the past year the council on orthopedic nursing of the National Organization of Public Health Nursing has directed attention toward the questions of evaluation of preparation in orthopedic nursing, compilation of suggested content for courses in orthopedic nursing, distribution of authentic material on orthopedic nursing as it relates to the care of various orthopedic conditions.

During the past year the National Organization of Public Health Nursing received a grant of money from the National Foundation for Infantile Paralysis, for the employment of a consultant in orthopedic nursing. The object of the emloyment of this individual, who is both a public health nurse and a physical therapy technician, was to provide consultant service in the field of orthopedic nursing and to prepare for release an orthopedic nursing manual for which there has been a constantly increasing demand.

At the time of the meeting of the council in New York in December 1939, consideration was given to the question of preparation of available personnel and the adequacy or inadequacy of such preparation to meet the variety of demands made upon those functioning in crippled children's programs. The suggestion made was that possibly we were expecting preparation which would approach the ideal but which might be impossible to demand when comparable remuneration would not be available.

The conclusions which could probably be drawn from these discussions are: first, that the present courses preparing physical therapy technicians are producing excellent institutional workers; second, some of the employment stimulated through the development of state programs for the care of crippled children falls within this institutional classification, and, third, much of the activity connected with state crippled children programs is definitely of a public health nature, some of which demands preparation in physical therapy and some of which requires a knowledge of orthopedic conditions and their care, without necessitating ability to grant physical therapy service.

It would seem that the public health nature of much of the work with crippled children should be given serious consideration by those who are responsible for the establishment of educational standards for physical therapy technicians, if physical therapy as a profession is to meet today's needs,

Respectfully submitted,

FLORENCE L. PHENIX.

Report of Representative to the Canadian Physiotherapy Association

I attended the first business meeting of the Canadian Physiotherapy Association, at which reports were read but no other business was transacted. At a luncheon directly after this meeting, they talked rather freely of their problems of reorganization and asked me a great many questions. Some of their problems are similar to those which we have solved or are solving, and they were very glad to know that they were going in the right direction.

The question of reciprocal membership by examination was discussed but no conclusion reached. However, at their March meeting they decided to enforce the following by-laws and require six months residence of American citizens:

By-law 1, Section 1 (a): "The following shall be eligible for election to active membership at the discretion of the Executive Committee or such subcommittee or committees as may be named:

(a) Graduates of a course in physical therapy recognized by this Association who shall have satisfied the requirements of, or passed the examination set by the Examining Board, in all subjects.

Section 2. "The executive committee shall under no circumstances allow a candidate to come before the Examining Board whose curriculum does not embrace a minimum course of twelve months, during which time at least ten hours practical and ten hours theoretical work weekly shall have been done under duly qualified teachers. A satisfactory amount of clinical experience shall also be required.

Miss McMurrich, the Secretary-Treasurer, wrote also, "The Executive Committee wish me to point out that electrotherapy is one of our required subjects. We require a minimum of six months' residence of C.S.M.M.G. graduates and would do so also in the case of American citizens. May I also point out the difficulties of the immigration laws of this country. Graduates of a Canadian course are given preference under this law and in all cases there is great difficulty experienced."

My conclusion is this—they would like to have their graduates eligible to take positions in this country, for, of course, we have many more opportunities than they have. But they feel that because of government regulations it would be difficult for our members to work in Canada. Their opportunities for post-graduate work in England have been cut off, and they would like to have their members enroll in our schools for post-graduate work. Their prerequisities are not the same as ours, so we should have to evaluate their training. They take high school graduates who have passed their "Senio matric"; that is, passed with honor five major subjects for college entrance. Their course is two university years, plus six months' internship in Toronto General Hospital.

They insist upon "refresher" courses for those members who have been inactive and who wish to resume practice. I was impressed by the very fine, earnest type of women in their Association and had a very interesting time at the cocktail party given by Mrs. Duncan Graham (a most charming woman), the banquet afterwards, and the dinner and tea on Sunday at Miss McMurrich's house. Some of them are planning to come to our convention in New York, and I hope to return the hospitality I received in Toronto.

Miss Kathleen McMurrich, of 184 College Street, Toronto, is Secretary-Treasurer; and Miss M. G. Finley, 1551 Bishop Street, Montreal, is President.

Respectfully submitted,
MARGARET W. CLEAVELAND.

Report of Committee to Investigate the Organization of a Reserve Group of Physical Therapy Aides

Enrollment Proposed by the American Red Cross

As you all know, the Army Nurse Corps, though a definite part of the Medical Department of the Army, has no reserve corps as such, as do the other branches of the Army. A list of available and qualified nurses is kept by the American Red Cross, however, which serves the same purpose as a Reserve Corps, if and when additional personnel is required in large numbers.

Since the Medical Division of the American Red Cross already had the office set-up and organization for the enrollment of the nurses, it seemed only logical that the War Department should request the American Red Cross to include in the enrollment this year for the first time physical therapy aides as well as other groups. The qualifications for individuals enrolled were established by the Office of the Surgeon General of the Army with the approval of the War Department. Announcements were sent to all the members of the American Physiotherapy Association, as well as the Registry.

Enrolled physical therapy aides, if called to active service, would be on the same status as those employed with the Medical Department at the present time—namely, that of a civilian employee. As such they would be protected under the United States Employees' Compensation Commission but would not be entitled to longevity pay, disability, age or period of service retirement and other benefits which are now enjoyed by members of the Army Nurse Corps.

We have had reports from chapters of the American Physiotherapy Association, as well as from the American Red Cross, informing us that the enrollment is proceeding at a very slow rate. This, we believe, is due to the discrimination against members of our profession in the matter of protection.

The chairman of this committee wishes to thank the individual members, as well as the chapters of the American Physiotherapy Association, for the support given to the proposed legislation to give military status to physical therapy aides and others now serving with the Medical Department of the Army.

On February 7, 1940, Senator Morris Sheppard introduced S. 3318 before the third session of the 76th Congress. The Bill "To authorize the appointment of female dietitians and female physical therapy aides in the Medical Department of the Army" was read twice and referred to the Committee on Military Affairs. An identical Bill, H. R. 8542, was presented on Feb. 19, 1940, before the House of Representatives by Congressman Andrew May, Chairman of the House Committee on Military Affairs.

We have been reliably informed that this year, as in 1939, the Bill had the support of the Surgeon General of the Army. However, the Bill was not approved by higher authority, as will be seen from the following extract from a letter which originated in the office of the Secretary of War:

> "It appears that the net charges against the government would not be initially increased by the enactment of this Bill, and that the eventual increased costs

would be immaterial.

"Irrespective of any question of additional costs, the War Department does not favor the enactment of the proposed legislation because there is no necessity for militarizing civilians employed in Army Hospitals as dietitians and physical therapy aides."

We have been reliably informed that this decision was not the result of any personal or group prejudice, but that the War Department felt that the passage of this legislation would merely pave the way for other groups to make similar demands.

In the past this committee has opposed the action of any members or chapters raising objection to the salary aspect of this legislation. It is more clear now than ever that when this legislation is again proposed, the American Physiotherapy Association must support this Bill as a whole. The opinion of the War Department would indicate that there still exists opposition to be overcome.

In commenting on association procedures for another attempt at this legislation, we are advised that form letters in large numbers are usually not read, and therefore are totally ineffective in attempting to solicit support from members of Congress. Short personal letters written on letterhead stationery if possible, and staggered over a period of time are read, and therefore have some weight.

Respectfully submitted,
EMMA E. VOGEL,
Chairman.

Convention Exhibit Awards

The prize winning exhibit consisted of apparatus with special attachments and adjustments for children with cerebral palsy. This exhibit was made by Mrs. Eleanor Farrell of Spaulding School in Chicago. Second prize went to Miss Lily Graham, Children's Hospital, Los Angeles, for a statistical map of the United States showing such data as membership of the American Physiotherapy Association, schools of physical therapy, et cetera.

Colorado Chapter

Mrs. Mary Byrd, a member of the Colorado Chapter, died on June 30, 1940, at Children's Hospital, Denver, after an illness of two months.

New York Academy of Medicine

The 1940 Graduate Fortnight of the New York Academy of Medicine will be held in New York City from October 14 to 25, 1940. The subject of the Fortnight is "Infections" and all members of the medical profession are cordially invited.

The Pacific Chapters of the American Physiotherapy Association have affiliated with the Association of Western Hospitals forming a Section on Physiotherapy as a component part of that organization. As such a unit, a section meeting was held at the Biltmore Hotel in Los Angeles, California, on Wednesday, April 10, 1940, at the time of and in conjunction with the convention of the Association of Western Hospitals.

The meeting, planned and carried out by members of the Southern California Chapter, was an outstanding one. The program* was unusually interesting and informative. The success of the meeting probably can best be pointed out by the fact that the conference room in which the meeting was held and which had a capacity for 150 persons had neither aisle space nor standing room left available when the meeting convened.

Too much praise cannot be given to the committee (Miss Grace Williams, Chairman; Miss Susan Roen and Mrs. Edna Farris) who planned the meeting. The results of their efforts are not only a great credit to themselves and the Southern California Chapter but to the American Physiotherapy Association as well.

The dinner meeting held by the Southern California Chapter in the evening, at which Dr. Rodney Atsatt, the entire Santa Barbara Chapter and a member of the Northern California Chapter were guests, was a fitting climax to a very worthwhile day.

It is felt that the affiliation which the Pacific Chapters have made is a very valuable one and one which will gain in importance and value. Meetings will be held annually in conjunction with the convention of the Association of Western Hospitals.

*See REVIEW, May-June 1940, issue.

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Conservative Surgery in Acute Hematogenous Osteomyelitis: Study of Forty-Five Cases at the Brooklyn Hospital. AINSWORTH LOCKHART SMITH, M.D. Med. Times, June 1940.

Diagnosis and Treatment of Acute Osteomyelitis. JOHN F. LECOCQ, M.D. Northwest Med., May 1940.

PERIPHERAL VASCULAR DISEASES

Evaluation of Some Methods of Treatment in Peripheral Vascular Disease. WILLIAM BIERMAN, M.D. Arch. P. T., May 1940.

POSTURE

Postural Reflexes. O. LEONARD HUDDLESTON, M.D. Arch. P. T., May 1940.

ULTRAVIOLET RADIATION

A Study of Two Hundred and Forty Breast-Fed and Artificially Fed Infants in the St. Louis Area. EDITH C. ROBINSON, M.D. Amer. J. Dis. Child., April 1940.

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A Note on the Ultra Violet Light Treatment of Ulcers. GUY H. FISK, M.D. J. Canad. Physio. Assoc., May 1940.

ABSTRACTS

John S. Coulter, M.D.

Frostbite and Trench Foot

Raymond Greene, D. M. In Lancet, No. VII of Vol. I, 1940, Feb. 17, 1940.

Treatment of the acute stage, which may conveniently be defined as the time during which the affected part is regaining its warmth, has undergone a complete change in recent years.

The danger of fires, hot-water bottles, and hot-water baths is obvious, for the stagnant circulation of the frozen part is incapable of carrying away this heat. Smith, Ritchie, and Dawson (1915), in their experiments with rabbits, have shown that, when the tissues of the feet have been damaged by cold, water at only 37 C. will cause a rapid edema or will greatly increase an edema already present. Treatment with warm water was followed by diffuse infiltration with red corpuscles and sometimes by hemorrhage, the damaged blood-vessels giving way under the strain of the congestion. In my view, rubbing the affected parts, even with snow, is extremely dangerous. Apart from the danger of increasing the congestion, there is the danger of further harm to the damaged, delicate, and perhaps brittle tissues. It may well be that many of the hemorrhagic blebs so often seen are due less to the frostbite than to the traditional treatment. Before experience drove home to me this lesson, I have both rubbed and been rubbed. The pain of returning sensation to feet even slightly frostbitten is an index to the damage done. I am profoundly suspicious of the advisability of using at this stage the machine for passive muscular exercise now in favor in America (Hermann and Read 1933, Shipley and Yeager 1934, Murphy 1937).

The frostbitten part should be kept absolutely at rest or as near to this ideal as circumstances permit. It should be thoroughly but most gently cleaned and wrapped in dry sterile dressings and in many layers of wool. Whether or not abrasions are present, antitetanic serum should be given. The patient should be given hot drinks and extra clothes, and he should be removed as soon as possible, by stretcher if the feet are involved, to a place of warmth and comparative comfort. Alcohol should not be given, owing to the peripheral dilatation which it produces. If it is impossible to move the patient, there is no better way of warming him than by the close contact of another human body.

Thereafter treatment should aim at avoidance of infection, absorption of the exudate, and restoration of the vascular condition. Whether anything can be done about the last two seems doubtful. Shortwave treatment, as one would expect, has its advocates (Burkmann 1934).

At this stage the machine for passive muscular exercise, already referred to, might conceivably be useful, but further trials are necessary. If gangrene develops, the usual surgical principles are followed, but it should be remembered that the line of demarcation may be slow in forming and appear to be considerably more proximal than the true level, the skin being destroyed over a wider area than the deeper structures.

Some Specific Measures in the Treatment of Rheumatoid Arthritis

H. M. Margolis, M. D., and V. W. Eisenstein, M. D. J. A. M. A., April 13, 1940.

Fever Therapy

When physical means became available for the administration of fever therapy, it was hoped that fever-inducing machines might be applicable in the treatment of rheumatoid arthritis. Extensive trial of this form of treatment was therefore carried out. Estimates of its effectiveness in atrophic arthritis have varied, depending to an extent on the enthusiasm of the observer. In general, the experience of others with this type of therapy has paralleled our own.

The results reported through our questionnaire confirm the impressions just described. Thus of ninety-two physicians reporting, 57 use, or have used, fever therapy as a modality in the treatment of rheumatoid arthritis. Good results were reported by very few; poor re-

sults were preponderant in the ratio of two to one. Reiterated in the replies were the dangers of fever therapy for all but the most robust patients. Two fatalities and two near fatalities were encountered. The next most frequent comment was the fact that whatever benefit results from fever therapy is only temporary, relapses usually occurring. The latter was the most frequent reason given for abandoning this type of treatment. The occasional good results reported have been those among young subjects with early atrophic arthritis or among those suffering from gonorrheal arthritis.

These answers indicate that fever therapy is not for the general run of arthritic patients. At present this measure holds little promise of benefit for the patient with rheumatoid arthritis. A combination of induced fever and some form of chemotherapy may possibly yield more worthwhile results in the future.

Pulmonary Embolism: Suggestions for Its Diagnosis, Prevention and Management

Geza de Takats, M.D., and Joseph H. Jesser, M.D. J. A. M. A., April 13, 1940.

Since Gray's communication, we have placed all patients after a major operation in a Trendelenburg position for twenty-four and occasionally for forty-eight hours. Excluded from such a position must be patients with intra-abdominal suppuration or with cardiac failure when such a position would lead to dyspnea. A 5 per cent angle can be readily accomplished by elevating the foot of the bed for from 8 to 10 inches (20 to 25 cm.). In case of shock this angle is usually increased to 10 degrees by doubling the elevation.

In the last five years 350 patients have been placed in this position at St. Luke's Hospital and the Illinois Research and Educational Hospitals. There was no postoperative thrombosis in this group, and the incidence of pulmonary complications as detected by clinical examination was 3 per cent. At the same time a group of 1,000 surgical cases at these institutions showed five cases of postoperative thrombosis.

Besides diaphragmatic movements and abdominal distention, the inactivity of these patients is an important factor. To overcome this and to improve venous backflow by active muscular contractions, we have used ordinary bicycle pedals that are mounted to the foot end of the bed. The two shafts of the pedal have to be balanced. A washer prevents undue friction, and the pedals are placed in a wooden frame with a bracket reinforcement. The pedals can be tightened or loosened so that they can be used with more or less resistance. The patients pedal on this stationary bicycle for five minutes three times a day, starting on the third postoperative day. As we believe in relieving postoperative pain by enough morphine to insure deep breathing and avoid motionless rigidity in one position, only seldom has any objection been raised on the part of the patient. In fact it serves in part as occupational therapy and encourages the patient to more active movement in bed. Regular breathing exercises and mild active movements of the lower extremities are equally effective.

Treatment of Arthritis

Regner W. Kullberg, M. D., and Lawrence M. Lowell, M. D. In Rocky Mt. Med. J., 37: 2:114, February 1940.

Almost all arthritics have a diminished chest mobility. It is reasonable that lung capacity in these cases must be limited. Undoubtedly, this is one reason why these patients are so rapidly exhausted on exertion. Even in individuals not afflicted with arthritis, there is a marked difference in the capacity for work between an individual who has a good expansion and one who has not. We have found that recovery generally increases in rapidity as the expansion becomes greater. Thus, the chest mobility becomes one index of recovery.

The problem of increasing the chest expansion of an individual who is ill without producing fatigue has been solved by the use of what we shall term the resting exercise and the warm pool.

The resting exercise consists of lying on a bed which is hard. This tends to stretch the body and allow freedom of motion and expansion of the chest while a soft bed tends to limit chest motion by its sagging action. A hard bed is conveniently made by putting boards under the mattress and over the springs. To sleep on a hard bed is a somewhat painful ordeal for a few days, but the patient invariably will like it after that. The patient should not use a pillow under the head. The use of a pillow under the middle of the back as soon as it can be tolerated for ten or more minutes four or five times daily is advised. This encourages breathing exercise without producing fatigue. As soon as possible the patient is encouraged to lift weights; light weights are used at first. Lying on a hard sur-

face with arms outstretched back of the head, the patient raises the weights to a vertical position, lowers them back to the original position, repeats this until only moderately fatigued.

We recognize that in chronic infectious (rheumatoid) arthritis we must have movement, but we feel that passive motion may do harm, that active motion is safer and can easily be had in the pool. No rapid motion is necessary when the condition is acute. Slow deliberate motion in warm water will do no harm or produce unnecessary pain. Water eliminates the fatigue-producing effect of gravity. The ease of movement in all planes is a surprise to the patient, making the treatment one of pleasure.

Asthenic and emaciated patients are not benefited by water if it is too hot. Steam baths, for example, have in our experience caused loss of weight, increase in sedimentation rate, and subjective decline. We have found that diathermy does not aid in the treatment. Heat, as furnished by the hot baths, diathermy or the so-called baker, has been found to be fatiguing, seems to cause demineralization of bone, and has done little towards progress in recovery.

Fibrositis

Oliver Abel, Jr., M.D., Walter J. Siebert, M.D., and Ralph Earp, M.D. J. Missouri State Med. Assoc., 36:11:435, November 1939.

Fibrositis is the commonest type of rheumatic affection. It is a disease of the white fibrous tissue.

Treatment should be directed first to the predisposing factors. These patients must be taught to keep themselves warm. They must wear warm clothing, avoid chilling and drafts. They must avoid both mental and physical fatigue. A certain amount of exercise is necessary, but a happy medium between the proper amount of exercise and exercise that might be fatiguing must be reached. This varies with individual cases. Rest is essential in the acute cases. Any defect in posture must be corrected. Proper attention should be given to the feet and correct shoes. Obesity should be avoided.

Massage is one of the most discussed forms of treatment in this condition. Scott states that deep massage causes malaise and rise of fever. He thinks that the nodule acts as a secondary focus which forces toxin into the circulation. Wilson advocates heavy massage and forceful breaking up of nodules even in rheumatoid arthritis. Hunt states that correcting foci of infection, giving rest and physical therapy produces best results.

It has been our experience that heavy massage definitely aggravates the condition producing more pain and stiffness that lasts as long as several weeks in some cases. We use massage only in the chronic cases and then a light massage.

The usual physical therapy measures are employed as short wave diathermy, infra-red and mecholyl iontophoresis. A useful home measure is to have the patient sit in a tub of hot water for from ten to fifteen minutes. The water should be as hot as the patient can stand it.

The question of vaccines is most controversial.

The Treatment of Flatfoot

A. S. Blundell Bankart, M.Ch., F.R.C.S. In Brit. J. Med., No. 4134, Page 537, March 30, 1940.

The correct attitude of the feet in standing is maintained by continuous reflex muscular activity. This postural activity, as it is called, is part of the postural reflex which maintains the body as a whole in the upright position, and, so far as the feet are concerned, it consists of a continuous resistance to abduction, eversion and flattening by the superimposed body weight.

But the commonest cause of flatfoot or foot strain is the sheer exhaustion of the postural reflex by prolonged standing or overuse of the foot. For, although the postural activity of muscle is almost insusceptible to fatigue, there are limits to the amount of work which any muscle can be called upon to do. Lastly, pain inhibits the postural reflex, so that any painful condition of the foot may lead to standing with the muscles relaxed and consequent flattening of the arch, or foot strain.

The treatment of foot strain is simple and effective. The feet should be forcibly manipulated under an anesthetic, and this should be followed immediately by massage and exercises. In practice the foot is manipulated in all directions, but especially in the direction of abduction and eversion so as to stretch the soft parts on the inner side and in the sole. The object of the treatment is to restore or increase mobility, so that the foot can yield without encountering resistance—that is, strain.

The chief, if not the only exercises required are: (a) while the patient is sitting—movements of circumduction, and (b) inversion of

the feet—that is, getting on to the outer borders and rising on the toes when the patient is standing. The patient should be told to make a habit of these last two exercises and not merely to do them occasionally at set times.

A distinction should be drawn between stiff (fibrous) flatfoot and rigid (osseous) flatfoot. In the former case the foot is stiff from fibrous adhesions or thickening in and around the ligaments.

The treatment of stiff flatfoot ideally is first to make the foot supple and then to reeducate its muscles. Many cases require manipulation under an anesthetic, but some experience is necessary to determine which cases are likely to be benefited by manipulation and which are not. When the stiffness is of long duration and very pronounced the reaction following manipulation may be so severe and the reformation of adhesions so great that nothing is gained in the end. This is particularly true of cases of rheumatoid arthritis, which as a rule are best left alone. In some cases more gentle manipulation repeated several times and combined with radiant heat, massage and exercises may bring about sufficient improvement. In less severe cases, and particularly in traumatic cases, forcible manipulation may be employed without hesitation and with benefit.

The treatment of spasmodic flatfoot is uncertain and often disappointing. The most common method is manipulation under an anesthetic and fixation of the foot in plaster in the inverted position for a considerable time. The usual result is that the spasm returns as soon as the plaster is removed and the patient bears weight on the foot. Some cases respond surprisingly well to manipulation followed by radiant heat, massage, and exercise; but it is necessary to keep the patient in bed during the whole of this treatment. Afterwards he should wear an outside steel with a valgus T-strap to prevent passive eversion of the foot. In some very resistant cases arthrodesis of the astragalo-scaphoid joint has been done. This abolishes the pain and spasm but of course it leaves a permanently stiff foot.

Treatment of Atrophic Arthritis

Arthur C. Hansen, M.D. In Wisc. Med. J., XXXIX:2:106, February 1940.

Rest undoubtedly is the first and most important single factor in the treatment of atrophic arthritis. Too much stress cannot be laid upon the necessity for mental as well as physical rest—rest from the cares of business and freedom from every emotional strain.

The relation of diet to arthritis is probably the most controversial phase in the whole treatment of arthritis.

Since there is reason to suspect that a relative vitamin deficiency exists in many patients with atrophic arthritis, the diet also is supplemented with vitamins.

It has been observed that joint symptoms can be aggravated by inadequate elimination. This phase of treatment too often is neglected. Drastic cathartics are not necessary.

It is difficult to decide just what role focal infection plays in atrophic arthritis. To gain the maximum amount of benefit the focus must be eradicated during the early stages of the disease.

The use of vaccines in the treatment of atrophic arthritis is another mooted question. Vaccine therapy is based on the assumption that the arthritis is caused by an infection of bacteria of low virulence. The organism most frequently found is the streptococcus. A vaccine may be made from a septic focus found in the patient and thus be autogenous, or it may be a stock mixture of a number of strains from various cases.

Of all the drugs used in the treatment of atrophic arthritis for the relief of pain, acetyl salicylic acid is the best. If this alone is insufficient, it may be combined with phenacetin and caffeine. In severe cases the addition of doceine is helpful.

Physical therapy is a very important adjunct in the treatment of atrophic arthritis. Heat, in whatever form it is applied, has only one purpose—to promote healing by improving the circulation to the joint. The patient should be taught home physical therapy.

Massage also is directed toward opening the vascular channels of the arthritic joint and thereby increasing the circulation. In early arthritis massage is contraindicated, as is heavy massage over a joint in the later stages. The danger lies in an increased local reaction. Superficial stroking is started over the joint in addition to the kneading massage above and below the joint. This should be preceded by at least fifteen minutes of heat and should be given for ten minutes twice a day.

Exercise should be begun gradually and must never be carried to the point of fatigue. Its purpose is to prevent stiffening and to help redevelop atrophied muscles. Active, forceful movements cause pain and endanger their usefulness.

Studies on Iontophoresis:

Experimental Studies on the Causes and Prevention of Iontophoretic Burns

By H. Molitor, M.D., and L. Fernadez. In Amer. J. Med. Sciences, 198:6:778, Dec. 1939.

1. Galvanic burns probably are caused by electrolytic changes within the tissues and not by the generation of heat or sparking between the electrode and the body.

2. These electrolytic changes result from extreme current densities due to excessive milliamperage or uneven conductivity over the electrode area (electrode metal touching body, insufficient thickness of padding, or existing skin defects).

3. The accumulation of caustics formed in the electrode is insufficient to produce burns, as shown by the application of hydrochloric acid or sodium hydroxide one hundred times as concentrated as found in the electrode padding.

4. The pH of the subcutaneous tissues under the anode or cathode shifts during iontophoresis toward the acid and alkaline side respectively.

5. The sensitivity of various parts of the human body to galvanic stimulation is practically uniform.

6. The ratio between the galvanic currents required to produce pain and burns was found to be approximately 3:4.

7. The safe current density varies with the size of electrodes.

Diagnosis and Treatment of Peripheral Vascular Disease

E. V. Hahn, M. D., and Paul Merrell, M. D. In J. Ind. State Med. Assoc., 33:3:130, March 1940.

The most important means of circumventing the disagreeable and often disastrous effects of occlusive arterial disease is the use of alternating positive and negative pressure apparatus (pavex). Quite simply stated, its effectiveness depends upon facilitating a compensatory hypertrophy of collateral blood vessels.

Indications for the use of passive vascular exercise are as follows: (1) Acute arterial occlusion from any cause. (2) Acute circulatory stasis of peripheral cause, as in frozen extremities. (3) Chronic obliterating arteriosclerosis of either major or secondary arteries, and (4) early thrombo-angiitis obliterans in the intervals between acute attacks.

Since passive vascular exercise has been so widely popularized it seems doubly important to emphasize important contraindications, the ignoring of which may lead to disaster. Some of these are as follows: (1) Active thrombophlebitis. (2) Cellulitis of any extent whatever and whether acute or subacute. (3) Lymphangitis. To these may be added certain other contraindications, not so much because of dangers involved, as because of futility. It is obvious that drawing an increased amount of arterial blood to a member will fail of its purpose if there is widespread occlusion in the capillary bed, or in the pre- and post-capillary vessels on either side. Therefore, we may add to the contraindications the following conditions: (4) Arteriolar obliterations. (5) Capillary thrombosis. (6) Capillary stasis in advanced thrombo-angiitis obliterans; and (7) capillary stasis in advanced arteriolar sclerosis.

Fractures of the Upper End of the Humerus Treated by Early Relaxed Motion and Massage

Ruffus H. Alldredge, M. D., and Marvin P. Knight, M. D. New Orleans Med. and Surg. J., 92:9:519, March 1940.

It should be remembered that greater care must be exercised in the treatment of any fracture, dislocation, injury or disease about the shoulder joint than in any other joint in the body. This is because of the peculiar anatomic make-up of the shoulder girdle. It is well known that the shoulder has a marked tendency to lose abduction and rotation following injury.

The objective in the treatment of these patients then is the early restoration of function. In order to restore function, early motion and massage are carried out so that immobilization may be dispensed with and the atrophy and changes taking place subsequent to disuse are prevented. Although it is well known that complete immobilization is desirable in order to obtain bony union in fractures in certain regions, this is not the case in fractures in certain other regions. Fractures in the upper end of the humerus seem to be an exception to the rule. Nonunion in this region is almost unheard of, whether there is impaction or not.

Advantages and Disadvantages of Relaxed Motion and Massage

It has been pointed out that these fractures frequently occur in old, obese people. It is needless to indicate the advantage of any method whereby plaster is not used. No splint

of any type is necessary. Since the patient is elderly it is desirable to keep him up and active as recumbency may produce a long train of complications. Hospitalization is not necessary when relaxed motion with massage is carried out. The patient may be completely ambulatory from the time of the injury and for this reason, this method of treatment is the one of choice from an economic standpoint. After a few periods of instruction, the patient may carry on his own treatment largely at home. Pain disappears after a few days and all soreness disappears by the end of two or three weeks. At this time active motion of the arm may be started and the bandage may be discontinued.

The chief advantage to the employment of this method of treatment is that a certain amount of cooperation and intelligence are essential on the part of the patient. Treatment by this method requires most careful observation and direction on the part of the physician in the early days of the treatment. These disadvantages are greatly outweighed by the advantages.

The patient is placed supine and superficial heat is applied for about 10 minutes. This is followed by light stroking massage beginning first about the shoulder girdle and shoulder proximal to the site of the fracture. Following massage a pad is placed in the axilla, the arm bound lightly to the side and the forearm placed in a sling. The patient is allowed to become ambulatory immediately. This is repeated daily for the next three days without removing the dressing. This period of treatment simply permits the patient to recover from shock and from the immediate pain suffered from the injury. If gross displacement is present, such as complete separation of the fragments with overlapping, manual reduction under anesthesia, of course, should be carried out. After reduction of the fracture, massage and relaxed motion are carried on in the usual way.

After the third day the heat and massage are followed by relaxed motion. At this time, after heat and massage have been applied, the patient is allowed to stand up. Great care should be exercised in the changing of the position so that the patient will not experience any discomfort whatsoever.

Relaxed circumduction of the shoulder is accomplished by having the patient bend forward while he is standing with the knees straight and with the hand of the normal arm resting on the table for support.

The Treatment of Painful Feet

Geo. W. Armstrong. In Can. Med. Assn. J., 42:3:227, March 1940.

The number of men who present themselves because of painful feet is relatively small. Between the ages of 15 and 30 there are practically none. After the third decade a few begin to feel the strain of physical exertion and of ill-fitting shoes.

Occasionally a man complains of pain beneath the longitudinal arch, resulting from fatigue of the tibial muscles. For several years I used a Whitman plate to relieve this condition but discarded it because the average patient would not wear it for more than a year. In its place I have come to use a shoe with an orthopedic heel and advanced counter, sometimes adding an inside lift of 1/16" or ⅛" to heel and ball or to the heel alone as the occasion demands.

Probably 90 per cent of people with foot trouble are women between the ages of twenty-five and fifty-five.

A certain number of women have pain in the feet from an arthritic background, simply a manifestation of a generalized disease.

Finally we come to that woman who suffers from the multiplicity of disorders inflicted by the shoe which our civilization and stylists dictate that she must wear.

When a person stands in his bare feet 60 per cent of his weight is carried on the heel. When the heel is raised 1 inch, weight-bearing is distributed equally between the ball and the heel of the foot. If it is raised another inch, 70 per cent of the weight-bearing is transferred to the ball of the foot. Therefore, if the patient has come complaining of pain beneath the heads of the metatarsals this is the first error that should be corrected. The second factor is that of wearing a rigid-shanked shoe. Regardless of its design, it limits motion in the foot to the metatarsal phalangeal joint. Thirdly, the average woman who comes complaining of foot trouble is wearing a shoe that is too small for her, either in length or width, or probably both. Finally, it is difficult, and sometimes impossible, to determine how many of the symptoms of this patient are the result of the alterations which have been worn in her shoes and how many are primarily due to improper weight balance. The patient is told that her trouble has not come on over night, that it has taken years to reach the present stage, and it will take weeks and even months to obtain relief. In

the first place I ask her to obtain an Oxford with a heel of medium height and a flexible arch. This must be fitted according to the author's instructions.

Temperature of the Gastrointestinal Tract and the Effect Thereon of Hot and Cold Drinks and of Physical Therapeutic Agents

H. M. Eberhard, A. M., M. D. In Review of Gastroenterology, 7:2:133, March-April 1940.

For this study a resistance thermometer and recorder were constructed by the Leeds and Northrup Company of Philadelphia and twenty-six months of intensive investigation were expended in investigating gastrointestinal temperatures.

In each case the temperature of the stomach was first recorded with the resistance thermometer. A piece of flannel was placed next to the skin and the abdominal wall covered with ice bags. At the end of one-half hour and again in one hour, the temperature was taken. The only difference was a decrease of 1 F. in the intragastric temperature.

Similar experiments were done with the resistance thermometer in the duodenum and the same results secured. The object in recording the temperature of the stomach and the duodenum after the application of an ice bag to the abdominal wall was to see if the lowering of the stomach's temperature was sufficient to warrant the application of an ice bag in cases of gastric or duodenal hemorrhage. If any therapeutic effects accrue from the application of cold to the abdominal wall, evidently it is not due to the stomach or duodenal temperature being lowered.

Of great interest when investigating the gastric and intestinal temperatures was the evidence gathered as to the effect of cold water or any cold drinks, food, et cetera, on the heart's action. Twenty normal cases were selected, ten women and ten men. These individuals were examined by a competent cardiologist and their hearts pronounced normal from the standpoint of auscultation, percussion, x-ray examination and electrocardiographic tracings. Each patient's gastric temperature was taken and the resistance thermometer withdrawn. Next the individual was given 250 c. c. of ice water at a temperature ranging between 34 and 40 F. Of these cases, twelve showed inverted T waves in leads 2 and 3. In the remaining eight, there was no change.

Book Reviews

THE LIVING BODY. A TEXT IN HUMAN PHYSIOLOGY. By Charles Herbert Best, M.A., M.D., D.Sc. (Lond.), F.R.S., F.R.C.P. (Canada), Professor and Head of Department of Physiology, Associate Director of the Connaught Laboratories, Research Associate in the Banting-Best Department of Medical Research, University of Toronto, and Norman Burke Taylor, M.D., F.R.S. (Canada), F.R.C.S. (Edin.), F.R.C.P. (Canada), M.R.C.S. (Eng.), L.R.C.P. (Lond.), Professor of Physiology, University of Toronto. Cloth. Price, $3.60. Pp. 563, with 298 illustrations. New York: Henry Holt and Company, 1939.

Best and Taylor are the authors of "The Physiological Basis of Medical Practice," one of the best textbooks of applied physiology for the medical student. This present volume by these authors is addressed to those seeking an elementary knowledge of the actions and reactions, physical and chemical, occurring in the human body. In their larger tests experimental authority is cited for almost every statement. However, in this book a more dogmatic method of instruction is adopted because the authors believe that experimental detail and intricate argument would prove wearisome to those for whom this book is written.

The volume is well bound and clearly printed. The illustrations are excellent. It can be recommended as a text in human physiology for liberal arts, dental and agricultural colleges and for schools for training physical therapy technicians.

A HISTORY OF WOMEN IN MEDICINE. FROM THE EARLIEST TIMES TO THE BEGINNING OF THE NINETEENTH CENTURY. By Kate Campbell Hurd-Mead, M.D. Cloth. Price, $6.00. Pp. 569, with 70 illustrations. Haddam, Conn.: The Haddam Press, 1938.

Howard Kelly in a foreword states: "Nevertheless the clarion call to womanhood for high achievements may be heard echoing down the centuries—preeminently in the Gospel of St. Luke and in other gospels where women play a conspicuous part in sustaining those virtues and spiritual qualities by which we truly live. The art of healing, for instance, has always been a major contribution of women to life. . . ."

The author states: "We today, who find women in the front ranks as social workers, as hospital consultants, as moral reformers, as peacemakers, are too ready to think of their place and activities as something new. Nothing could be further from the truth. From the remotest times there exists abundant record that in each and all of these fields women were always active and always without ostentation."

It is interesting to read that the ancient Aztecs, other American Indians, the inhabitants of some of the islands of the Pacific and the natives of African jungles always employed women healers, who worked by manipulations or hot drinks or baths or by other methods to exorcise evil spirts. Physical therapists should note that in ancient Greece while priests were being paid for praying, the medical women and priestesses were, among other treatments, massaging painful joints.

The author shows that the part played by women has been, from the very dawn of recorded history, not only of outstanding importance but also of appealing human interest. What we have not realized is that, down through the centuries, there have been women —and many notable ones—who successfully practiced medicine. This volume is highly recommended to those interested in medical history and in women's work in the world.

ILLUSTRATIONS OF BANDAGING AND FIRST AID. Compiled by Lois Oakes, S.R.N., D.N. (Leeds and London), Nursing Editor, Nursing Illustrated, Lake Sister-Tutor, Walton Hospital, Liverpool, Examiner to the General Nursing Council. Cloth. Price, $2.00. *Pp.* 248, *with* 290 *illustrations. Baltimore: The Williams and Wilkins Company,* 1940.

This book is divided into four sections: triangular bandaging, roller bandaging, first aid in hemorrhage and first aid in fractures. The author states: "Never before in the history of Great Britain has the necessity for preparedness been so uppermost in the mind of the public. With the Government using every resource to render our land safe to live in, it has also become the urgent duty of every man and woman to assist in these measures. Not the least of these is the duty of becoming efficient in the technique of first aid."

The same words could apply to the United States. This book is well illustrated and the principles of bandaging and first aid are clearly given. It is recommended for first aid and physical therapy students.

THE BRAIN AND ITS ENVIRONMENT. By Joseph Barcroft, Professor of Physiology, Cambridge University. Cloth. Price, $2.00. *Pp.* 117, *with* 30 *illustrations. New Haven: Yale University Press; London: Oxford University Press,* 1938.

This is a very scholarly presentation of the more subtle activities of the brain in the embryo and at birth. The responses of cerebral activity are closely related to environmental changes, particularly in the blood supply and more specifically through oxygen exchanges. It is a treatise which would be of interest to physiologists and those interested in the finer reactions which take place in the brain.

THE MEDICAL STENOGRAPHER. By Effie B. Smither. Cloth. Price, $2.00. *Pp.* 399. *New York: The Gregg Publishing Company,* 1939.

This is a companion book to the Gregg Medical Shorthand Manual. It provides dictation material and at the same time gives the prospective medical secretary a reasonably simple fund of basic medical knowledge. It is highly recommended to those taking dictation from physicians.

HEADACHE AND HEAD PAINS: A READY REFERENCE MANUAL FOR PHYSICIANS. By Walton Forest Dutton, M.D., Director, Medical Research Laboratories, Amarillo, Texas. Cloth. Price, $4.50. *Pp.* 301, *with* 6 *illustrations. Philadelphia: F. A. Davis Company,* 1939.

Headache is perhaps one of the most common complaints observed in medical practice. It is a symptom which may result from functional and organic diseases arising in various parts of the body. As a result of this, treatment necessarily varies considerably. The layman's inadequate knowledge of the significance of headache has given rise to the constantly-increasing number of patent medicines and nostrums. The author warns against the symptoms and the treatment of headache without uncovering the etiologic factors responsible for this complaint. He discusses a rational approach to the problem by considering headaches of local origin, arising within the cranial cavity, such as due to meningitis, brain tumor, etc.; those due to systemic diseases, Bright's disease, gout and others. In addition, he discusses facial pains such as trigeminal neuralgia and referred pains from neighboring disease processes. For each type of headache and pain the most

efficacious drugs are listed or the surgical treatment mentioned where it is indicated.

The material is arranged in a manner similar in many respects to the old-fashioned textbooks. Nevertheless it contains much worthwhile information for the physician.

CARE OF POLIOMYELITIS. By Jessie L. Stevenson, A.B., R.N., Consultant in Orthopedic Nursing, National Organization for Public Health Nursing; Associate Editor, The Physiotherapy Review; formerly Supervisor, Orthopedic Division, Visiting Nurse Association of Chicago; formerly Instructor in Physical Therapy, Northwestern University Medical School. Cloth. Price, $2.50. *Pp.* 230, *with* 43 *illustrations. New York: The Macmillan Company,* 1940.

This is an outstanding monograph on the practical home treatment of infantile paralysis. Definite instructions for the technique of everything that should be done for the patient after his dismissal from the hospital are given very accurately and are explained very concisely and carefully. Miss Stevenson has had wide experience in the treatment of this disease and in teaching methods of care to others as a supervisor in the Visiting Nurse Association of Chicago and as instructor at Northwestern University Medical School.

There are chapters on the problem of infantile paralysis, the acute stage, convalescent nursing care, convalescent physical therapy, functional restoration, the making of splints and a corset and a description of a device for moving the patient from the bed to the underwater exercise tank. The illustrated instructions for making apparatus, for a home underwater exercise tank and for splints are especially valuable.

This is a most practical book. It is worded in simple terms that are easily understandable and, therefore, it is highly recommended to parents and others who have the care of paralytic patients. It should be in the library of all public health nurses, physical therapy technicians and orthopedic nurses.

FEARFULLY AND WONDERFULLY MADE: THE HUMAN ORGANISM IN THE LIGHT OF MODERN SCIENCE. By Renee von Eulenburg-Wiener. Cloth. Price, $3.50. *Pp.* 472, *with* 18 *illustrations. New York: The Macmillan Company,* 1938.

In view of the ever-increasing fund of knowledge regarding man's structure and behavior, one must agree with the title of this book that the human body is "fearfully and wonderfully made." The author has attempted to present many of the known facts of the human organism in its relation to the universe. He does so by discussing the fundamental physico-chemical laws and the chemistry of the various functions, starting with a simple single cell, leading up through the various organs and systems of the body and finally dealing with the human organism as a whole.

Although the style and presentation of this volume make it appear difficult and burdensome reading, nevertheless it contains considerable important and instructive material.

SURGERY OF THE HAND. SOME PRACTICAL ASPECTS. By John Harold Couch, M.A., M.B., F.R.C.S. Edin., Department of Surgery, University of Toronto and Toronto General Hospital. Foreword by W. E. Gallie, M.D., F.R.C.S. Eng., Dean of the Faculty of Medicine, University of Toronto. Cloth. Price, $1.50. *Pp.* 147, *with* 35 *illustrations. Toronto: The University of Toronto Press,* 1939.

This is a manual discussing the everyday problems of injuries and infections of the hand. The material is set forth in straightforward fashion without elaboration. The illustrations are excellent line drawings. It should be in the library of every practitioner, and, if followed, should lead to a great reduction in the suffering and subsequent disability that results from injuries and infections in the hand.

THEORIES OF SENSATION. By A. F. Rawdon-Smith, M.A., Ph.D. Cloth. Price, $2.75. *Pp.* 137, *with* 18 *illustrations. Cambridge: The University Press; New York: The Macmillan Company,* 1938.

Through the physiology of vision and hearing the author has presented the important subject of sensation as revealed by the special senses. The first section deals with the most modern concepts of the formation of retinal images, visual acuity and color vision. This is followed by a similar approach to audition wherein the anatomy and physiology of the hearing mechanism is discussed.

This work is an excellent scientific résumé prepared by a careful student of physiology and the reader will be well repaid for the time and close study which the material will demand of him.

THE HOSPITAL CARE OF NEUROSURGICAL PATIENTS. By Wallace B. Hamby, M.D., F.A.C.S., Associate Professor of Neurology, University of Buffalo School of Medicine, Buffalo. Cloth. Price, $2.00. *Pp.* 118, *with* 24 *illustrations. Springfield, Illinois, and Baltimore: Charles C. Thomas, Publisher,* 1940.

Inasmuch as neurosurgery deals with the operative procedures upon such vital structures as the brain and spinal cord, it is obvious that special considerations may be needed in the nursing and aftercare of patients so treated. This book has been written for nurses and for physicians who come in contact with neurosurgical patients. The first part gives a review of the practical anatomy of the central nervous system. This is followed by descriptions of special procedures, such as spinal puncture, encephalography and ventriculography. The special problems of the care of patients suffering from injury or tumors of the brain or spinal cord are described. A final chapter on postoperative dressings, although short, is very valuable.

Although individual neurosurgeons may have their own refinements which they employ in the care of their patients, the general principles outlined in this book no doubt are those which are universally advocated.

HANDBOOK OF ORTHOPEDIC SURGERY. By Alfred Rives Shands, Jr., B.A., M.D., Medical Director of the Nemours Foundation, Wilmington, Delaware; Associate Professor of Surgery in Charge of Orthopedic Surgery, Duke University School of Medicine, Durham, North Carolina (on leave of absence). In collaboration with Richard Beverly Raney, B.A., M.D., Associate in Orthopedic Surgery, Duke University School of Medicine. Second edition. Cloth. Price, $4.25. *Pp.* 567, *with* 154 *illustrations by Jack Bonacker Wilson. St. Louis: C. V. Mosby Co.,* 1940.

This second edition of this excellent concise textbook of orthopedic surgery has been revised to include new and accepted forms of therapy. Many illustrations have been redrawn for the sake of uniformity and many new ones have been added. The bibliography of outstanding articles written in English has been revised to July 1939.

Beside the introduction there are chapters on congenital deformities, affections of growing bone, affections of adult bone, infections of bone (exclusive of tuberculosis), tuberculosis of bones and joints, chronic arthritis; neuromuscular disabilities; infantile paralysis, involvement of brain and spinal cord and involvement of peripheral nerves and muscles; tumors; fracture deformities; body mechanics and physical therapy; affections of the spine and thorax; affections of the low back; affections of the hip, knee, ankle, foot, neck, shoulder, elbow, wrist, hand and jaw.

This book is recommended as a textbook for the medical student as a book presenting the fundamental facts and principles of orthopedic surgery to the general practitioner and as an excellent reference book for physical therapy technicians in orthopedic hospitals.

PRACTICAL CHILD PSYCHOTHERAPY. By Dr. Curt Boenheim. With a foreword by Prof. Dr. H. Finkelstein. Cloth. Price, 10s. 6d. *Pp.* 177. *London: John Bale Medical Publications, Ltd.,* 1938.

Today it is very well recognized that many illnesses of childhood are of nervous origin rather than due to organic disease. The unregulated emotions of the child are subject to minor or greater upheavals. These disturbances may come to the surface in common symptoms such as loss of appetite, vomiting, enuresis, masturbation, thumb sucking, speech disturbance, headaches and many other illness reactions. The author pleads for a better understanding of this psychogenic basis of illness and the use of psychotherapy as an important tool for its correction.

THE SELF YOU HAVE TO LIVE WITH. By Winfred Rhoades. Cloth. Price, $1.75. *Pp.* 182. *Philadelphia, New York, London and Toronto: J. B. Lippincott Company,* 1938.

This is another of the ever-increasing list of psychologic treatises intended for the layman. Many of them deal with the more commonly accepted problems of human behavior as viewed through the eyes of the psychologist who is physiologically minded. They admonish one to "know thyself" and to know the problems of the environment to which one must react. The present author, however, is more philosophic in her approach and calls upon religion to help the individual make a more adequate adjustment in a difficult world.

HOW TO ATTAIN AND PRACTICE THE IDEAL SEX LIFE: IDEAL SEX AND LOVE RELATIONS FOR EVERY MARRIED MAN AND WOMAN. By Dr. J. Rutgers. This book is a complete translation by Norman Haire, Ch.M., M.B., of "Das Sexualleben in seiner biologischen Bedeutung." Cloth. Price, $1.98. Pp. 397. New York: Falstaff Press, Inc., 1937.

Because of its title this book arouses curiosity and some hope for information on this important subject which should interest everyone. The lay public is becoming more and more open minded and indeed anxious to be enlightened concerning the anatomy, physiology, psychology and philosophy of sex. Despite the large number of such treatises on the bookstands, very few accomplish satisfactorily the purpose for which they are intended. Some definitely are pseudoscientific and must be considered "cheap literature." A few are worth reading.

The present volume contains a great deal of information, but the arrangement and style of print make it difficult and tedious reading. Important and desirable facts lose their value in the mass of detailed description which gives the book considerable bulk. This is not one of the better presentations of the subject of sex.

BACTERIOLOGY. CLIO MEDICA. By William W. Ford, M.D., D.P.H., Emeritus Professor of Bacteriology, School of Hygiene and Public Health, Johns Hopkins University. Cloth. Price, $2.50. Pp. 207, with 8 illustrations. New York: Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, 1939.

This is another of the "Clio Medica" series of primers on the history of medicine. The author shows that possibly more than any other science bacteriology has been the handmaiden of other sciences and its development has been the result of the attempt to answer certain fundamental questions by the use of the microscope.

There is a review of the early observations and theories which influenced the development of bacteriology. This includes a short history of spontaneous generation, bubonic plague, syphilis and the origin of suppuration. There are chapters on the development of knowledge concerning magnification; the discovery of bacteria by Leeuwenhoek; the progress in the eighteenth century in relation to spontaneous generation, origin of disease and knowledge of bacteria and the progress in the first part of the nineteenth century up to Henle.

From the year 1840, after the enunciation of the clear-cut principles of Henle, the study of the organisms revealed by the microscope was prosecuted by the anatomist, pathologist, physiologist, physicist, botanist, and zoologist. The author traces the influence on bacteriology of Pasteur, Tyndall, Lister, the German School of Bacteriologists under Cohn and the work of Koch. There also are chapters on Pasteur's work on vaccination against anthrax, swine erysipelas and rabies; on bacterial toxins and antitoxins, on the development of immunology and on the later developments of bacteriology.

This little volume, along with the twenty-one other volumes of this excellent series, should be in the library of everyone interested in history.

VITAMIN D: CHEMISTRY, PHYSIOLOGY, PHARMACOLOGY, PATHOLOGY, EXPERIMENTAL AND CLINICAL INVESTIGATIONS. By C. I. Reed, A.M., Ph.D., Associate Professor in Physiology; H. C. Struck, M. S., Ph.D., Associate in Physiology, and I. E. Steck, M.S., M.D., Instructor in Physiology and in Medicine, Department of Physiology and Department of Medicine, College of Medicine, University of Illinois, Chicago. Cloth. Price, $4.50. Pp. 389, with 13 illustrations. Chicago: University of Chicago Press, 1939.

This valuable monograph serves a number of important purposes. It gives a comprehensive review of the chemistry, pharmacology and physiology of Vitamin D and related compounds. It gives excellent reviews of the research that has been done on the relation of Vitamin D to the parathyroid glands, to energy metabolism, to resistance to infection, to mineral metabolism, and to blood constituents. The therapeutic uses of Vitamin D in rickets, in arthritis and other diseases also are described.

This monograph also serves another important purpose. Vitamins are of such a nature that they readily lend themselves to promotion and to abuse for selfish purposes. The public now is confronted with a tremendous amount of propaganda which often is without regard to facts and possible dangers. The reliable and authoritative information contained in this volume should serve to counteract such abuses.

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